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REVIEW ARTICLE

RECENT DEVELOPMENTS IN GROUNDNUT PRODUCTION, WITH SPECIAL REFERENCE TO AFRICA. PT 2[1]

BY

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HUSBANDRY FACTORS

DATE OF SOWING

Recommendations are almost unanimous in advocating sowing as early as any other overriding factor allows. In the USA this may be after the last killing frost, in N. Africa at the earliest date on which soil temperature is adequate, and in tropical Africa, after the onset of the first rains. Studies in the Congo (De Preter, 1953) and Tchad (Niqueux, 1955) show a linear and highly significant decrease in yield from earliest to latest sowings amounting in some years to 1800 lb. per acre over a 6-week period. This was partly due to increased rosette attack on later sowings ; nevertheless in Egypt, where rosette is not found, yields decrease 45% from April to June sowings (Egypt. Minist. Agric., 1955). Early sowing has always proved best in Tanganyika, even in the absence of rosette, probably because growth has then a better chance of completion before the end of the rainy season ; although the effects of day-length on net assimilation rate cannot be excluded (Bunting, 1958). Sauger *et al* (1954b) have also shown an influence of date of sowing, independent of rosette ; both resistant and susceptible strains declined in yield with late sowing, although the latter were more seriously affected. Studies on factors influencing quality are limited, but Shear and Miller (1952, 1955) showed that later sowings produced smaller plants with fewer nuts from runner varieties. The time of peg initiation was critical for fruit development, and, as the season progressed, fewer pegs developed fruit. The rate of growth of later-formed fruit decreased and they were less mature at harvest. Sauger (1954a) states that varieties bearing the highest proportion of early flowers will generally yield most and it seems likely that early sowing stimulates early-flower formation, although there is controversy concerning the extent to which flowering is controlled by external factors. Further studies on the effect of sowing date on period of maximum flowering, percentage of pegs forming fruit, and the size and maturity of fruit formed, would be valuable.

SOWING PRACTICES

Many factors have required investigation, on several of which evidence as to the desirable practice is now fairly conclusive. They include :

1. *Sowing shelled or unshelled seed*

Studies on viability (USDA, 1943) show that unshelled seed germinates well after 4–5 years' storage, but that viability is reduced to about 3 months after shelling ; Virginia varieties lose germinative energy more rapidly than Spanish. Bouffil (1951a) confirms that shelled seed, stored in sacks at normal temperature, loses 86% of its germination in 5 months, but claims that germination can be preserved indefinitely in airtight receptacles. Cold storage appears to be of no benefit. Subject to storage limitations, graded, shelled seed has germinated more evenly and quickly than unshelled seed, especially in drier soils (INÉAC, 1954c) ; also, hand-shelled seed is invariably superior to machine-shelled, owing to breakage by machines (De Preter, 1953). Although soaking seed before sowing is sometimes advocated, trials in Nigeria (Butler, 1954) and Senegal (Bouffil and Tourte, 1952) condemn this practice (which, in any case, is most inconvenient) because of adverse effects on germination, and increased susceptibility to fungous infection. If, as has recently been claimed (Prévot and Ollagnier, 1957), soaking followed by dehydration increases the retention of water in the plant tissues during drought for the majority of the growing season, the practice may become more widely adopted.

2. *Fungicidal treatment of seed*

Treatment of seed with fungicides against diseases such as *Aspergillus niger*, *Rhizoctonia solani*, *Sclerotium rolfsii*, *Rhizopus nigrus* and *Penicillium glaucum*, whilst not giving complete and long-lasting protection, offers an effective means of preventing initial losses, thus ensuring the high population essential to maximum yields. It is particularly effective where seed has been shelled or sown mechanically, since these practices often rupture the testa and facilitate fungous penetration. Sturkie

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[2] Now with Borax Consolidated Ltd., London.

and Williamson (1951) showed that treatment of high-vitality, hand-shelled seed in Virginia increased stands only 5%, but the increase from treating similar machine-shelled seed was 20–35%. In Libya (Oram, 1957b), treatment of good, hand-shelled seed did not increase yields significantly, but initial populations were increased 4–14%, depending on the formulation used. The seed in these trials was close-planted (12 in. × 6 in.), and the effect of improved stands on yield may be greater with wider spacings. Here, as elsewhere (Senegal, Belgian Congo, Rhodesia, USA), compounds containing thiram and captan are reported to be more satisfactory than mercurial compounds, which sometimes affect germination adversely. Treatment may be carried out up to 9 weeks before sowing without ill-effects (Wilson, 1948 ; INÉAC, 1954a), although sowing within 12 hr. of treatment may reduce its effectiveness (Jaubert, 1952). Sauger and Thevenin (1950) showed that application rates greatly exceeding manufacturers' recommendations could be tolerated but these had no greater protective value, the optimum economic dressing being 0·2–0·4% by weight. Although spectacular yield increases may not always result, fungicidal dressings applied to seed provide a valuable and cheap insurance of a good initial population. This is instanced by the fact that 98% of farmers included in surveys in Alabama (Blackstone, 1952) sowed treated seed, and in Africa in 1955, 820,000 tons were treated with thiram in Senegal, alone. The extension of the principle of combining fungicides with insecticides in seed dressings is likely to make the practice even more widely beneficial ; and the incorporation of dieldrin in seed dressings combined with treatment of the soil with the same chemical at 1 lb. per acre, has helped establishment, and markedly controlled termite attacks on developing pods in the Sudan (Bunting, 1958).

3. *Spacing and plant population*

Little fundamental research concerning these factors appears to have been attempted. Hall *et al* (1953) relate their studies on nutrient uptake and root range to spacing, but the population of 25,000 plants per acre, which they consider optimum, falls far short of that indicated by ordinary spacing trials. However, nutrient uptake through gynophores and fruit does not seem to have been considered. The statement by York (1952) that most of the fruit is borne within a radius of 4–6 in. of the main axis may indicate why closer spacing of plants in the row than that indicated by assessments based on root radius, alone, is necessary. Applied research in many countries shows the pre-eminent influence of spacing and population on groundnut yields. Sturkie and Williamson (1951) report numerous trials in the USA which suggest strongly that yields could be increased considerably by closer sowing in narrower rows. The Spanish variety has been most widely studied at spacings varying from 36 in. (rows) × 24 in. (seeds in row) to 18 in. × 4 in., and the highest yields, both of foliage and fruit, have invariably resulted from the highest populations. Spacing must be related to growth habit and the optimum therefore varies between varietal groups, runner varieties requiring the most space. However, yields from Virginia Runner in 18-in. rows were, respectively, 1·7 and 1·9 times those from 27-in. and 36-in. rows (Bledsoe, 1953), whilst York (1952) states that Virginia Bunch yielded 600 and 1200 lb. per ac., respectively, less nuts from 24-in. and 36-in. than from 18-in. rows. Farm populations were frequently only 40% adequate, and a study of 135 farmers in Alabama (Blackstone, 1952) showed that only 17% planted as close as the recommended distance of 36 in. between rows, which itself exceeds the optimum suggested by spacing trials.

The benefits obtainable from a high plant population include insurance against losses from disease, and, in Africa, close spacing assists in countering rosette. Recommendations vary widely from 40,000 to 145,000 plants/acre according to variety, moisture regime, and the likelihood of rosette, but, as in the USA, the highest yields have been obtained from high populations. Linear yield increases up to 40% as distances decreased from 28 in. × 12 in. to 12 in. × 12 in. (100,000 plants/acre) have been obtained in the Congo (De Preter, 1953). In S. Africa, rows 8 in. apart showed a 40% increase over rows 42 in. apart (Pretorius and Thomas, 1953). Yields of 2000 lb. kernels/acre are obtained from populations of 145,000 plants/acre in the Sudan; and in Libya (where rosette is not present), sowing Virginia Bunch at 12 in. × 6 in. increased yields 23% over spacing at 24 in. × 12 in., an average increase of 470 lb. unshelled nuts/acre (Oram, 1957a). Similar results have been obtained in India, where reducing row-spacing from 24 in. to 12 in., with 9 in. between plants, increased yields on farms in the Punjab by 47% (Negi and Dalal, 1956). Trials in Madras suggest that for early upright bunch types spacing could be even closer, as 9 in. × 6 in. (90 lb. shelled seed/acre) increased yields significantly over 9 in. × 9 in., 9 in. × 12 in. and 12 in. × 12 in. in a 3-year trial (Rao and Srinivasalu, 1957). Sowing more than one seed per hole is recommended in the Congo, and is also practised in Nigeria, Libya, Nyasaland, and the Sudan. This ensures a better stand in the row and allows wider inter-row spacing, but it cannot be done mechanically. Mechanical planters at present available cannot much exceed 70,000 plants per acre (i.e. seeds 4–6 in. apart in rows not less than 24 in. apart) ; moreover cultivation is restricted where rows are less than 18 in. apart. In practice, therefore, where moisture is not a limiting factor, sowing to produce the populations of

over 100,000 plants/acre postulated for maximum yield from field trials, is limited to areas of cheap and plentiful hand labour, or where, as in Libya and Israel, production is for a specially remunerative market and exceptional yields are essential to offset irrigation costs. The crux is economic, and although cost of extra seed for closer sowing has been exaggerated in view of higher returns, labour costs may render unprofitable a population exceeding that which can be sown and weeded mechanically. The development of improved seeders (such as the modification of standard grain drills to use rubber feed-rollers which do not damage seeds) may in future allow a higher population to be planted and thus lead to higher average yields.

The effect of spacing on quality has been less widely studied, but Bunting (1956) states that close spacing suppresses formation of late flowers, Prevot and Ollagnier (1954) state that seed from closely-spaced plants forms closer to the base of the plant, and therefore matures more evenly. They show that seed produced from plants spaced at 16 in. × 6 in. and sown the next year at the same spacing, yielded on an average 27% more per plant than that sown at 16 in. × 6 in. but obtained from plants grown the previous year at 16 in. × 32 in. spacing. When seed was sown at 16 in. × 32 in. there was still a difference in yield per plant in favour of that produced from plants grown the previous year at 16 in. × 6 in., but this was not significant. Further studies on the effects of spacing on quality are needed ; these may also reveal more concerning its profound influence on yield, which has not been adequately explained by the investigations so far undertaken.

Little evidence is available to compare sowing on ridges with sowing on the flat, or in twin rows compared with single rows. Ridging facilitates lifting from dry soil, but closer sowing is possible on the flat, and this probably outweighs any advantage of ridging where maximum yield is important and soil and moisture conservation are not overriding considerations (Sellschop, 1955). Where these factors render ridging necessary, the highest yield will probably result from ridges as close as the moisture supply and the available implements permit. Tourte and Fauché (1952) do not consider that twin rows are superior to single but suggest that erect varieties benefit most from ridging.

WEED CONTROL

Groundnuts are not aggressive in their early growth stages and Oram (1957b) reported yield reductions of 66% (1940 lb./ac.) in Libya from unweeded plots, compared with those weeded four times by hand. Bunting and Lea (1957) in the Sudan delayed weeding for 25 days without reducing yield, but such delay may hinder future cultivation through weeds obscuring the rows. In the USA, hoeing or rotary cultivation fortnightly, from time of emergence until peg-elongation begins about 8 weeks later, is considered essential for good yields. Inter-row cultivation must cease soon after this, but by then the plants compete quite well with the weeds.

Frequent cultivation is expensive and the cost of effective weed control may determine profit or loss. Herbicides have therefore been investigated with promising results and 90% reduction in cultivations is reported from Virginia (Virginia Polytech. Inst. Agric., 1956) through spraying, though comparative costs are not given.

Annual grasses (*Digitaria sanguinalis*), and broad-leaved weeds including *Xanthium* sp., *Ipomoea purpurea*, *Amaranthus retroflexus*, and *Chenopodium album* have been controlled for 4–6 weeks by pre-emergence application of 2,4-DES and dinoseb (USDA, 1956), or CDAA (Wangerin, 1955). Trials in Libya, summarized by Oram (1957a), show that the two last species, and, in addition, *Thlaspi arvense*, *Portulaca oleracea*, *Tribulis terrestris*, *Malva parviflora*, *Urtica annua*, and *Emex spinosa* are controlled by PCP and 2,4-D ethyl ester; whilst sodium 2,4-D controls *Ipomoea cordofana* (Bunting and Lea, 1957). 2,4-D sometimes delays germination (York, 1952) but phytotoxicity has rarely been reported with these compounds as pre-emergence sprays. Post-emergence sprays are limited to materials safe for the crop, dinoseb and possibly MCPB, but timing is very critical in relation both to crop and weed. Witherspoon and Rodgers (1954) claim that dinoseb applied at first-compound-leaf stage caused little damage to groundnuts and controlled weeds for 12 weeks more economically than pre-emergence treatment ; and Watson and Nation (1957) stated that the alkanolamine formulation is both safe and effective as an early post-emergence spray at 3 – 4·5 lb./acre. Further comparisons with pre-emergence application are necessary before a definite conclusion can be reached.

Perennial grasses are not controlled by any of the above materials, and where *Cynodon dactylon*, *Imperata cylindrica*, or *Cyperus* spp. are common they present a serious problem. TCA shows promise against *C. dactylon*, but repeated and deep cultivation to expose and dry-out rhizomes and tubers seems the best solution for the other species. Since they are often associated, a combination of TCA spray with cultivation, though expensive, is at the moment the most effective overall control.

Further work is urgently needed to determine the comparative costs of cultivation and spraying, to test the value and range of control for post-emergence spraying, and to control perennial grassy weeds cheaply without fallowing.

MECHANIZATION

MACHINERY DESIGN

The groundnut crop has been neglected by

machinery manufacturers, and attempts at mechanization have often been frustrated by unsuccessful adaptation of machines designed for other crops or for conditions different from those in which they have to work. This is discussed in detail by Gaudefroy-Demombynes (1953) concerning Senegal. Similar difficulties have been experienced in Libya (Oram, 1957a) and communications received from the Sudan, Uganda, Nyasaland, Tanganyika and Ghana show that machinery design, especially for shelling, sowing, lifting and threshing (picking), leaves much to be desired. Because of the expense of importing and testing a large range of machinery, several territories have designed their own implements, and a trial centre for machinery development has now been established in Senegal (Gouv. gén. AOF, 1956). The principal sources of expenditure in groundnut production are the peak labour periods of sowing (including shelling) ; and harvesting, (the sequence of digging, windrowing, transport, threshing and decortication). Some factors in the design of planters have already been discussed and this is of particular importance because of the profound influence of high population on good yields. Lifting can be facilitated where soils tend to be difficult at harvest, by ridging to assist the entry of the digging blade, and careful timing so that the crop is lifted when the top soil is as friable as possible. However, mechanization of groundnut production in Africa still presents thorny problems and few published reports of machinery trials are available. To achieve maximum yield whilst reducing peak labour demands, the principal requirements in machinery design appear to be :

(1) Cheap power-operated shellers suitable for use by Africans.

(2) Planters suited to both ridge- and flat-sowing which will not damage seed. (Vertical plates are less liable to damage seed than horizontal ones.) Economy in capital might be achieved if the machinery could also place fertilizer, or be adapted for use later as a weeder and a lifter. Alternatively, good adaptation of a grain drill for groundnut sowing would reduce capitalization. Simple planters for small-scale farmers are also required.

(3) Elevator-diggers which dig, shake, and place the crop ready for collection. Tourte (Conf. Arachide-Mil, 1955f) prefers digger-shakers with a discontinuous loading device building small heaps, to digging followed by raking into windrows, which tangles up plants and leads to losses.

(4) Combine-harvesters. Existing machines are usually modified grain harvesters, which presuppose a dry crop ; but no suitable ' once-over ' type which will dig, strip, clean, and bag freshly harvested groundnuts exists. This is under investigation by the National Institute of Agricultural Engineering in England, but until and unless a suitable machine appears, combining from a dry windrow or carting to a stationary thresher remain the alternatives to hand-stripping. A combine might prove unprofitable in these circumstances when adequate cheap steel threshers exist. It is probable that any mechanical lifting/picking device will work better with erect than runner strains. Cutting of foliage as an aid to harvesting has been studied by Marchand and Catharinet (1952). Cutting 8 days before lifting dries the nuts and increases germination percentage, but reduces yield by 10%—a figure probably in excess of any saving effected by easier threshing.

THE ECONOMIC USE OF MACHINERY

Studies in Senegal (Tourte *et al*, 1954b(1)) show that man-hours per acre are reduced from 192 for manually operated farms, to 140 for animal traction, 61 for partial mechanization, down to a theoretical 12 man-hours with fully mechanized extensive culture, peak labour requirements being especially reduced. However, expenses rose inversely, complete mechanization costing four times as much as manual and thrice as much as animal labour, because of the restricted use for the machinery and heavy amortization. This has been confirmed in Ghana (Ghana, Dir. Agric., 1957) where work-cost per acre for ploughing, ridging, and sowing by machine is only a quarter that of hand labour, but other expenses require that yields should be raised from 800 to 2,000 lb. per acre, and the area cropped per farm greatly increased to render mechanization profitable. Where farms are generally small, labour cheap, and machinery operation relatively inefficient, the use of animals with improved implements plus co-operative mechanization of certain tasks, offers, therefore, a more rational solution than full mechanization. In Nigeria, for example, Government aid in mechanical ploughing and ridging at cost (£1 10s. and 10s. acre, respectively), has proved a great help to small farmers. Co-operative decortication works very successfully in the Congo, where fixed machines at strategic centres have proved more practical if slightly more costly to operate than mobile teams. The entire cost of decortication, with a large but simple machine with low labour requirement, represented only 3·7% of the total cost of purchase, collection and storage by Government, with shelling damage below 1% (Janssen, 1954).

The advantages of mechanization depend greatly on local environment, the area of groundnuts grown by each farmer, farm layout, availability of labour, and the level of education of the population. In Senegal, the average holding is under 10 ac. and full mechanization is clearly undesirable, socially or economically. In Alabama (Blackstone, 1952) the average size of 135 farms studied was 85 ac. with one-third under ground-

nuts, but even there full and efficient mechanization was the exception, not the rule. Larger enterprises, however, may prove impracticable without mechanization, owing to labour difficulties. This is the case in the clay soils of the Sudan where mechanization has proved to be economically sound at a cost of £15 per acre with yields averaging 1000 lb. (Clinton, 1957). Where yields are lower, operations must be reduced but machines must remain adequately employed. In Tanganyika, yields vary from 600 to 1,000 lb. per acre, but production costs are only £6, with ploughing, two weedings and digging the only mechanized operations. A careful study of the regional environment and demographic situation is therefore essential for the economic success of mechanization, as well as a judicious selection of the tasks to be mechanized and the machinery to do the work.

DISEASE

Three types of infection are of widespread significance :

(a) FUNGAL AND BACTERIAL INFECTIONS CAUSING PLANT NECROSIS. A complex of pathogens cause seed and seedling failure; certain of these diseases, especially *Sclerotium rolfsii* and *Bacterium solanacearum*, also cause losses later in growth. Since these organisms are both seed- and soil-borne and may inhabit other species, manure or compost, no general control is possible; but seed dressing, close sowing of sound seed, and the use of rotations will reduce losses. Martin (1956) found that seedling infection of 13–17% on land cropped under a sound rotation may rise to 37% where groundnuts follow groundnuts. Varietal resistance has been proved to bacterial wilt only, and although susceptibility to the other diseases varies with variety it seems unlikely that any could be developed with resistance to the entire groups. Clinton (1957a) has noted a relationship between water-logging of soil and *Sclerotium* wilt and claims that the disease can be controlled completely by ploughing to a depth of 8 in. or more. He states that continuous cropping causes a progressive increase in the disease and, as with others in this category, sound husbandry therefore seems to offer the best method for control.

(b) LEAF-SPOT INFECTION. The causal agents are *Cercospora arachidicola* and *C. personata* and the disease is globally distributed and has been much studied, especially in the USA. Miller (1946) states that although cultural and climatic factors affect the severity of attack, chemical treatment of foliage is the only sure control. Finely-ground sulphur has superseded copper sulphate in the USA, and dusting 15–20 lb. per acre at 3 fortnightly intervals from about 90 days after sowing, raised yields on 30 farms studied by an average of 492 lb. nuts and 1674 lb. hay per acre. Treatment resulted in larger plants with more, larger and more strongly attached nuts ; but lifting must be slightly delayed, plants spaced in wider rows, and after lifting, wilted for 24 hr. Controversy exists concerning the reduction in yield attributable to *Cercospora*. Private communications from Southern Rhodesia, Nyasaland, Uganda and Kenya differ in assessing its economic importance and the value of control by chemicals. Increases of 10–100% in yield have been obtained from chemical treatment in Nyasaland, copper sprays being the most successful, but the small and scattered farms there would probably make a campaign uneconomic (Hoyle, 1957). Conversely, in Egypt (Egypt. Minist. Agric., 1955), where losses are estimated at only 5–10%, dusting is recommended. The frequency of rainfall has an important bearing, both on the incidence of the disease and the effectiveness of treatment ; Jaubert (1951–52b) states that in Senegal, where yields are lower than in the USA and rain more frequent, costs of dusting would be prohibitive, despite an estimated 20% loss from the disease. Nevertheless, copper oxide spray (0·35% applied twice at 30 gal. per acre) proved profitable in the Congo, increasing production 40–60 % over the unsprayed yield of 1050 lb. per acre (INÉAC, 1955). Copper spray and sulphur dust have given comparable results in Tanganyika (Tanganyika. O.F.C., 1955), but copper sprays appear to be generally preferred in tropical Africa and it would be interesting to know why. Cultural measures, such as windbreaks to reduce wind dispersal of spores, rotational practices, and cultivation may lessen infection, since *Cercospora* can overwinter on groundnut debris, or spread from volunteer groundnut plants ; but whether it is transmitted by seed is not yet certain. Varietal reactions differ. Spanish and erect, bunch types are more susceptible than spreading varieties, but Garren and Wilson (1951) state that no truly resistant variety has yet been developed in the USA. However, since Hemmingway (1954) states that long-season, spreading, bunch types in East Africa display resistance, selection and hybridization may yet offer control for areas where spraying is impracticable ; although physiologic races of *Cercospora* can develop (Miller, 1954), and may hamper progress.

(c) ROSETTE. This disease, produced by a virus (*Arachis Virus* 1 *Smith*), for which *Aphis craccivora* is the vector, is common to wetter parts of Africa and S.E. Asia, but is not reported from the USA, North Africa, or Southern Europe. In the Sudan it occurs only south of the great swamps. A loss of 60–90% results from severe attacks and much attention has been devoted to its control, mainly through cultural methods, varietal resistance and destruction of vectors. The disease is not soil- or seed-borne, but is transmissible by grafting, it can attack from early-growth stages, causing

stunting and distortion, with or without chlorosis, and leads to reduced yield, with many unfilled pods. Close spacing to ensure good stands is widely practised. Tourte and Fauché (1954a) show (see Table 1), that the percentage of infected plants to total population falls sharply as population increases. However, a calculation of the number of plants infected per acre based on theoretical densities (shown as the last column in the Table), indicates that this remains more or less constant in any one experiment. This is in line with most previous work on this problem, and suggests that closer planting does not in fact offer a true control of the disease, but rather an insurance against losses through a greater number of uninfected plants being left over at harvest.

TABLE 1

GROUNDNUT-PLANT POPULATION AND INCIDENCE OF ROSETTE DISEASE

Spacing	Theoretical/density plants/ha.	plants/ac.	Rosette plants as % of total population	Infected plants/acre*
60 × 5 cm. (24 × 2 in.	332,000	134,500	7.9	10,800
60 × 10 cm. 24 × 4 in.	166,000	67,200	20·9	13,800
60 × 20 cm. 24 × 8 in.	83,000	33,600	41·2	14,000
60 × 40 cm. 24 × 16 in.)	41,500	16,800	65·7	10,700

*Calculated figure based on theoretical density/acre.

Early sowing is essential, Sauger *et al* (1954b) show that susceptible high-yielding varieties suffer particularly from late sowing. Early sowing combined with close planting gives adequate control in Uganda (Uganda. Dep. Agric., 1952) ; but when short-season varieties lacking seed dormancy are sown early they may mature before the rains are over, with consequent loss from sprouting in the soil and excessive weather damage during curing. More serious, however, is the fact that shed seeds may germinate and the resultant plants provide food for the aphid vectors—Evans (1954) has reported as many as 95,000 self-set plants to the acre in May from the short-season variety Natal Common. In June, 80% of such plants were aphid-infected, with an average of 50 aphids per plant. Although these numbers decline as the dry season progresses such plants are a serious reservoir of infection, especially where rotation is inadequate. Late-maturing varieties have seed dormancy, and few volunteer plants will appear in areas where the soil is too dry for germination by the time this dormancy is broken. The spread of primary infection will thus be greatly reduced.

Differences in susceptibility to the virus between and within groups of varieties has been demonstrated in Tanganyika (Evans, 1954), where certain spreading bunch varieties of the Mwitunde (Asiriya) group are unfavourable to the multiplication of vectors, and the rate of spread of secondary infection is therefore reduced. They are not truly resistant however, and where primary infection is severe the incidence of the virus will remain high. This may account for reports that Tanganyika material has proved inferior to West African selections in Senegal (Gouv. Gén. A.O.F., 1956) ; but it is also probable that different strains of the virus exist. Some of the West African varieties are reported to be truly immune, and similar claims have been made from South America (OEEC, 1953), but no comparison appears to have been made between material from the two continents. None of the 15 lines developed at Bambey shows more than 1% attack, compared with 60–91% in susceptible strains ; but although outyielding the latter by an average of 39% in the worst rosette areas, resistant varieties are markedly inferior elsewhere. They therefore have definite limitations. Correlation between resistance and other characters is not clear ; in Tanganyika spreading types only show a low incidence of secondary infection (a disadvantage for mechanical production); in the Congo erect varieties appear more resistant, while in Senegal Sauger *et al* (1954b) consider that no link exists between resistance and growth habit, or precocity.

Evans (1954) and Appert (1955) have studied control of the vector by insecticidal application to soil, seed and foliage. Both workers found systemic insecticides, particularly schradan, to be toxic to aphids, but the period of effective control from foliar sprays appears to be longer in East Africa than in Senegal, probably due to climatic differences. Spraying is likely to be most effective where secondary spread is the main problem, but the period over which control of aphids must be maintained is prolonged and treatment is likely to be too costly in climates such as Senegal, where each application only provided 15 days' effective protection. 3% parathion wettable powder applied to the soil in Senegal at a rate of 180 lb./acre, one month after sowing, was absorbed by plants and actually raised yields by 82%, but although this method was considered the most practical, the cost proved prohibitive. In the Congo (INÉAC, 1954b) parathion emulsion at 80 g. active material/acre as a foliar spray with 5 applications at 10-day intervals, beginning 10 days after sowing, gave effective control. This method, or the application of cheaper, non-toxic

contact insecticides such as endrin emulsion might be economic, since 100 g. active agent/acre of the latter is reported by the Gouv. Gén. A.O.F. (1956) to remain toxic for 15 days (as long as schradan). Tsi (1950) and Evans (1954) have shown that seeds can absorb schradan and that resultant seedlings are toxic to aphids for a few weeks after germination. Provided that germination is not severely affected this might provide a cheap, effective and simple control of initial infection ; to be followed by spraying against secondary spread.

Evans has also studied the biology of the vector and its predators and shows that the former can survive on several alternate host plants (although these do not apparently provide a reservoir of the virus), as well as on volunteer groundnuts. Control therefore centres on elimination of self-set plants, and checking aphid spread from natural vegetation early in the season. A higher population of predators would be invaluable in reducing aphids, and ways by which this might be achieved include deliberate breeding of predators or the development of an environment more favourable to their multiplication. Further work along these lines should yield interesting results and the effect of insecticidal application on predators as well as vectors also seems worthy of attention.

At present no method of control is completely effective and the precautions taken must vary according to severity and frequency of attack. In areas of infrequent loss, close, early sowing of sound seed of high-yielding varieties may offer sufficient protection ; elsewhere this method could be combined with inexpensive chemical treatment, but only in very bad localities, where other methods are ineffective or uneconomic, should the low-yielding, resistant varieties at present developed be used.

SUMMARY

Groundnuts are now grown in every continent and under widely varying conditions of soil, climate and social environment. Although this makes the interpretation and comparison of experimental results more difficult, it nevertheless adds greatly to our knowledge of the crop.

The requirements for a good yield are now fairly well-known. They are : the use of sound, selected seed ; early sowing ; the closest spacing that will allow economic weed control ; and lifting at the optimum time to combine maximum yield with minimum loss from shedding or sprouting. Quality has been less completely studied ; it is determined mainly by variety, nutrient status, spacing, and proper curing after harvest. Fertilizers should be applied to correct nutrient deficiencies, but the crop does not respond to heavy dressings, and if grown in a sound, well-manured rotation, it is unlikely to require much direct fertilization. Rotation of cropping also helps to reduce disease, since chemical control is not always efficacious over the range of conditions under which groundnuts are grown. The highest yields are probably obtained from the use of conscientious hand labour, but neither manual nor fully-mechanized culture appear economical for many medium-sized farms, and there is a need for better animal-drawn implements and co-operative mechanization. Machinery manufacturers could be of much greater assistance in furthering the development of mechanization in under-developed areas than is, at present, the case.

A very wide choice of varieties has been developed and these should be classified on an international basis to provide a means for improving stocks in countries which cannot afford costly (and often unnecessary) breeding programmes. Criteria for recording and reporting varietal trials also require standardization, especially in terms of quality; the best experimental design for varietal testing in relation to disease, for which conventional plot layouts have not always proved satisfactory (Evans, 1954), requires further study.

The role of nitrogen and of nitrogen-fixing bacteria in the nutrition of groundnuts requires particular attention, as does the interaction of N with P and of K with Ca and S. In this respect, soil pH and the nature of the clay fraction appear to be especially significant. More fundamental research is required concerning nutrient uptake, the relationship between this and spacing, and the way in which spacing determines yield and quality. The effect of these factors on flower- and fruit-formation is probably the key to the problem, since although varieties vary considerably in their productive capacity, a high degree of reproductive inefficiency is common to the species.

Chemical weed control appears to be very promising for groundnuts, but the control of perennial monocotyledons is still an intractable problem. The relative inefficiency of chemical control measures against plant diseases and some pests in tropical areas is a difficulty and in view of the serious losses from *Cercospora* and rosette, the development of cheap formulations which are persistently effective in hot, humid conditions should prove rewarding.

Much has been done to extend our knowledge of the groundnut but many gaps still remain, particularly in fundamental matters of nutrition and physiological development. The OEEC report on groundnut cultivation in West Africa states that "research in this field has barely scratched the surface and dozens of vital problems have not yet been touched". This is true not only for West Africa and there is little doubt that yields of this important and somewhat neglected crop could be increased almost everywhere it is grown by the allocation to research of additional funds

and technical staff. A greater degree of international co-operation in higher research, and in the interchange of breeding material and information, offers the best chance of increasing our knowledge of this crop and of assisting those countries which cannot afford an extensive programme. These can nevertheless progress by tackling the more straightforward problems of varietal improvement, suitable fertilizers, spacing, and disease control and then extending their findings to the farming community.

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FIELD CROPS

CEREALS

WHEAT

See also Abs. 653, 840

452 Wuth, E. Ergebnisse von Aussaatzeitenversuchen mit Derenburger Silber und Peko. [**Time-of-sowing trials with Derenburger Silber and Peko.**] *Dtsch. Landw.* 1957, **8**, No. 9, 430–2, bibl. 6. [Inst. Landw. Versuchs- und Untersuchswes., Jena, E. Germany]

Results of twenty 3-yr. trials showed that, irrespective of soil or season, late sowing of the winter-wheat Derenburger Silber reduced yields ; sowing in December gave a 20% lower grain-yield than sowing in October. The yield from the December-sown spring-wheat, Peko, was 5% higher than the December-sown, and was lower than the October-sown, Derenburger Silber. Peko sown in January or February gave almost as good grain- and straw-yields as October-sown Derenburger Silber.—D.B.

453 Anant Rao, N. K. and others. **Response of wheat varieties to different sowing dates and seed rates.** *Indian J. agric. Sci.* 1956, **26**, No. 4, 351–60, bibl. 7. [Received August, 1957] [Balwant Rajput College, Agra]

Results of 3 years' trials reveal that Pb591 is the most suitable variety, that 30 seers per ac. is the best seed rate and that late October to early November is the optimum sowing date for wheat in Agra district [1 seer =2·057 lb. in Bengal].—From authors' summary. D.B.

454 Baumann, H. and Klatt, F. Beregnungszeitpunktversuche mit Hafer- und Winterweizensorten. [**Trials for determining the times for irrigating oats and wheat.**] *Z. Acker- u. PflBau* 1957, **103**, No. 4, 380–96, bibl. 7, illus. [Inst. Acker- u. PflBau, Humboldt-Univ., Berlin, E. Germany]

The paper opens with a discussion on irrigation of cereals from 3 aspects : replenishing the soil with water, compensating for the vagaries of weather, and the stage of plant development. Irrigation of cereals was more successful if carried out when the temperature was rising. In these experiments, which were conducted on clay soils, the first irrigation in spring was the most important one. Varieties reacted differently to irrigation. Of the wheats, Hadmerslebener II and IV gave good grain yields, and Derenburger Silber and Bastard II gave increased straw yields, but Langensteiner Braun was not a suitable variety for irrigation. Of the oat varieties, Flämingsgold and Bördeweiss reacted best.—D.B.

455 Daniel, H. A. and others. **Stubble mulch and other cultural practices for moisture conservation and wheat production at the Wheatland Conservation Experiment Station, Cherokee, Oklahoma, 1942-1951.** *Prod. Res. Rep. 6 Agric. Res. Serv. U.S. Dep. Agric.* 1956, pp. 44, bibl. 7, illus. [Agric. Res. Serv., Guthrie, Okla] [Received Oct., 1957]

Wheat production after ploughing, listing, basin listing and stubble mulching on terraced and unterraced land were compared, both in continuous cultivation and in rotation. Runoff was least from mulched land, and greatest from listed land where cultivation was up and down the slope. A combination of terraces and contour cultivation reduced runoff 35%, but increased yield by only 1·1 bu./ac. With both rotations and continuous cultivation, yields were highest on ploughed land, and lowest on mulched land where weeds and disease competed with wheat. Wheat responded only slightly to application of N, but the increase was greatest on mulched land. P-application increased yield 40% and N + P increased yield 58%.—From authors' summary. R.B.

456 Simon, U. Achtung – Auswuchs bei Getreide ! [**Premature germination of cereals.**] *Dtsch. landw. Pr.* 1957, **80**, No. 33, 326, illus. [Landessaatzuchtanstalt, Weihenstephan/Freising, Bavaria]

In S. Germany, the continuous rainfall from the end of July, 1957, caused premature germination of cereal grains both in the harvested grain in stooks and in the ears of the standing crop. Some winter-wheat varieties were much more prone to ear-sprouting than others. The tendency was strong in Carsten VI and Carsten VIII, frequent in the standing crop in Zapfs Neuzucht, Hauter II and Graf Toerring II, but was much weaker in Taca, Firlbeck and Werla. In addition to obvious germination, in which radicle and leaves were visible, many grains reached the swelling stage so that their viability was necessarily reduced. The economic consequences of ear-sprouting are mentioned.—D.B.

457 Auriau, P. Quelques données sur le climat du blé dans le Proche-Orient. [**Some data on the climate of wheat in the Near East.**] *Ann. Amélior. Pl., Paris* 1957, **7**, No. 1, 5–18, bibl. 5, illus., English, German and Russian summaries. [Inst. Franç. Coop. Tech., Sta. Libano-Franç., Tell-Amara]

The principal climatic characteristics of the wheat regions in the Lebanon, Syria and Jordan were determined on the basis of the data collected. To synthesize these data, Emberger's pluviometric quotient Q was calculated for each station : $Q = 1000P \Big/ \left(\frac{M+m}{2}\right)\left(M-m\right)$ in which P is the average annual rainfall in mm., M the average (calculated on 10 years) of the maximum tempera-

tures of the warmest month in absolute degrees and *m* the average (calculated on 10 years) of the minimum temperatures of the coldest month in absolute degrees. The seasonal relative pluviometric coefficients were also calculated according to Angot. The altitude, latitude, longitude, rainfall- and temperature-data are given for each station.—E.B.O.

458 SALMON, S. C. and REITZ, L. P. **Distribution of the varieties and classes of wheat in the United States in 1954.** *Agric. Handbk No. 108, U.S. Dep. Agric.* 1957, pp. 86.

459 INSTITUUT VOOR RASSENONDERZOEK VAN LANDBOUWGEWASSEN, WAGENINGEN. Bericht over rassenkeuze No. 232. Wintertarwe, 1957. [**Choice of varieties. Pamphlet No. 232. Winter wheat, 1957.**] *Suppl. 15, Landb Voorl.* 1957, **14,** No. 9, 1–5.

Grain yields obtained in 1956 from 15 standard winter wheats and from 8 other varieties newly taken into the inter-provincial trials are tabulated, the varieties being grouped according to their degree of winterhardiness. Short descriptions of all the varieties are given.—G.M.R.

460 SIMON, U. Versuche zur Unterscheidung deutscher Weizensorten am ruhenden und keimenden Korn. [**Attempts to distinguish German wheat varieties by the resting and germinating grain.**] *Z. Acker- u. PflBau* 1957, **103,** No. 4, 397–426, bibl. 18, illus. [Inst. Acker- u. PflBau, Techn. Hochsch. München, Weihenstephan, Bavaria]

The grains of a number of German named varieties of wheat were examined to discover their most important morphological varietal characters and to test the usefulness of these characters for identifying varieties. 1000-grain weight, dimensions, general shape, shape at the bearded end, length and stiffness of hairs, colour of grain and grain quality were examined. These characters exhibited a gradation from one variety to another, and only when they were expressed as one extreme did they provide reliable distinctions between varieties. For this reason, and because they are easily modified by environment, morphological characters can be used for identification in an auxiliary capacity only. Distinctions based on physiological behaviour are more dependable. The clearest distinction is the coloration obtained, after a certain number of hours, by staining with 1% phenol solution. The test is often completed within 4–6 hr., and, if combined with observations on the presence or absence of a coleoptile staining within 3–4 days, or with the staining of the leaf-sheath hairs after a longer period, provides an infallible test for the identification of most varieties. Auxiliary physiological tests are the coloration obtained from a benzene extract (of the carotene) of the grain and germination tests. A key for the identification of 18 gluten wheats is given.—D.B.

461 TRENTIN, A. Sulla scelta della varietà di grano. [**The choice of a wheat variety.**] *Agricoltura d. Venezie* 1957, **11,** No. 10, 558–64. [Ist. Genet. N. Strampelli, Lonigo, Italy]

The yields and hectolitre weights are given of the best wheat varieties grown in northern Italy in 1956–7. Produttore and Leonardo gave the best average yields of the 3 years 1955–7.—E.B.O.

462 LIGNON, R. and AURIAU, P. Étude préliminaire sur les populations de blés cultivées dans le Proche-Orient. [**Preliminary study on the wheat populations grown in the Near East.**] *Ann. Amélior. Pl., Paris* 1957, **7,** No. 1, 19–59, bibl. 8, illus., English, German and Russian summaries. [Inst. Franç. Coop. Tech., Sta. Libano-Franç., Tell-Amara]

The principal wheat populations (*Triticum durum* and *T. vulgare*) grown in the Lebanon, Syria and Jordan were studied during 1952–6. These populations are classified into groups and types, the most important group being the durum wheats with a very compact spike. The characters of the various types are described.—E.B.O.

463 PATIL, J. A. **How to distinguish between Niphad-4 and Kenphad-25 wheat.** *Farmer, Bombay* 1957, **8,** No. 10, 9–13, illus. [Dep. Agric., Bombay]

464 KOHLI, S. P. and MITRA, A. K. **Two new wheats for the Uttar Pradesh hills.** *Indian Fmg* 1957, **7,** No. 6, 20–2, illus. [Wheat Breeding Substa., Indian Agric. Res. Inst., Simla]

In 5-yr. trials with several wheat varieties in rust- and smut-prevalent areas, at altitudes of 1000–7000 ft., NP 770 (bred at the above substation) and Ridley (an Australian variety) were the most resistant to rusts and smut and gave yields which were 32 and 51%, respectively, above NP 4 and local varieties. NP 770 is a long-eared, fairly tall, strong-strawed wheat and is recommended for altitudes above 4000 ft. Ridley is short and stiff-strawed and is recommended for the lower hills up to 4000 ft. Both varieties should be sown as early as possible.—D.B.

465 SHIER, F. L. and REEVES, J. T. **Wheat and barley trials [in Western Australia] 1956-57.** *J. Dep. Agric. W. Aust.* 1957, **6,** No. 5, 537–41.

466 HABEL, W. Über die Wirkungsweise der Eggen gegen Samenunkräuter sowie deren Empfindlichkeit gegen den Eggvorgang. [**The action of harrowing on weeds in the seedling stage and their susceptibility to harrowing.**] *Z. Acker- u. PflBau* 1957, **104,** No. 1, 39–70, bibl. 9, illus. [Inst. PflSchutz, Landw. Hochsch. Hohen-

heim, Stuttgart/Hohenheim, W. Germany]

Before their emergence weed seedlings were not killed by harrowing with a fine-toothed zig-zag harrow or with a "weed comber" (a smaller implement). Harrowing after weed emergence killed the weeds by burying them, the cotyledonary stage being the most sensitive. The seedlings of small-seeded species, *Papaver rhoeas*, *Sonchus asper*, *Euphorbia exigua*, *Anagallis arvensis*, *Chenopodium album*, *Viola tricolor* and *Veronica persica*, were most easily destroyed because, when buried to a depth of 0·5 – 1·0 cm., they could not readily emerge again, nor could they withstand periods of drought. Weed seedlings of large-seeded species, e.g. *Ranunculus arvensis*, *Adonis aestivalis*, *Galium aparine*, *Veronica hederaefolia* and *Lithospermum arvense*, required a soil covering of 2 cm. to inhibit their re-emergence. When wheat was in the 4- to 6-leaf stage, fine harrowing left the wheat undamaged.—D.B.

467 Levine, M. N. and Geddes, W. F. **Effect of leaf [*Puccinia triticina*] and stem rust [*Puccinia graminis tritici*] on productivity, desiccation rate, and kernel weight of spring wheat at successive stages of development.** *Cereal Chem.* 1957, **34,** No. 6, 410–21, bibl. 16. [Inst. Agric., Univ. Minnesota, St. Paul]

468 FAO. Rapport de la première réunion FAO sur la lutte contre la punaise des céréales, tenue à Ankara (Turquie) du 3 au 7 décembre 1956. [**Report of the first FAO meeting on the control of plant bugs on cereals held in Ankara (Turkey) 3 - 7 Dec., 1956.**] *Meet. Rep. 1956/25 FAO* pp. 23, maps.

Delegates from Iran, Syria and Turkey, and observers from the USA, Morocco and the USSR, attended this meeting. Information is given on the damage caused by plant bugs on cereals (the principal noxious species being *Eurygaster integriceps*, *E. maura* and *E. austriaca*, *Aelia rostrata*, *A. cognata*, *A. acuminata* and *A. germari*) and on possible control measures.—E.B.O.

469 Brown, H. E. **Hessian fly control with systemic insecticides.** *Pl. Prot. Bull.* 1957, **5,** No. 10, 149–55, bibl. 5. [Missouri Univ., Columbia, USA]

The results of field trials indicated that systemic phosphate insecticides, when applied in a fertilizer mixture, can control the Hessian fly (*Phytophaga destructor*) on wheat at economic levels over a period of at least 5 weeks. Thimet gave better protection than isosystox. When thimet 44% was applied at 800 and 1600 g./ac., the number of maggots per 100 plants was 3 and 0, respectively, against 138 in the control.—E.B.O.

470 Valdeyron, G. and Seguela, J.-M. Principales conclusions obtenues après trois années d'études sur le mitadinage du blé dur. [**Principal conclusions drawn after three years of studies on yellow berry of durum wheat.**] *C.R. Acad. Agric. Fr.* 1957, **43,** No. 12, 651–4, bibl. 6. [Serv. Bot. Agron., Tunisia]

With wheat plants grown in vegetation tanks, stopping the supply of N before flowering was the only treatment which caused yellow berry. Results from field trials were inconclusive. It is concluded that, in practice, yellow berry is caused by deficiency of N in spring, and is an accurate indicator of soil exhaustion which easily occurs in the cereal/fallow rotation in North Africa. The introduction of a green manure in this rotation is the best practice for avoiding both soil exhaustion and yellow berry, and for raising wheat yields.—E.B.O.

471 Rufelt, H. **Influence of the composition of the nutrient solution on the geotropic reactions of wheat roots. Influence of temperature on the geotropic reactions of wheat roots. Influence of growth substances on the geotropic reactions of wheat roots.** *Physiol. Plant.* 1957, **10,** No. 2, No. 3, 373–96, 485–99, + 500–20, total bibl. 113, illus. [Bot. Lab., Univ. Lund, Sweden]

472 Petinov, N. S. and Pavlov, A. N. [**The role of individual organs during grain filling in wheat.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1957, **117,** No. 1, 146–9, bibl. 5, illus. [Timirjazev Inst. Pl. Physiol., Acad. Sci. USSR]

The protein content of wheat grain is related to the proportions of nitrogenous substances and carbohydrates present. This relationship is unstable under the influence of certain conditions of plant growth, primarily N supply and the water regime. A good N supply leads to an increase in the protein content of the grain, but an increase in soil moisture lowers its protein content. Furthermore, as the leaves grow older, the N content is augmented at the expense of the carbohydrates [see *Fld Crop Abstr.* 8 : 1194]. The authors have studied the nitrogenous substances and carbohydrates which accumulate in the wheat grain from various organs of the plant, with special reference to the role of the different organs during grain ripening. The tests were carried out : (1) during 1954 in the dry Saratov Province under irrigated conditions with the hard spring wheat Černokolosiĭ ostistyi; and (2) during 1956 on an experimental field in the Lenin Hills near Moscow with the soft spring wheat, Moskovskaja. To determine the role of the empty glumes and leaves in grain filling, experiments (2 replications) were initiated at the beginning of grain formation with the following variants (20 ears in each) : (1) control ; (2) leaves removed ; (3) leaves removed and ears shaded ; (4) ears shaded. There is evidence that absolute grain weight is lowered (in % of the control) to 84, 81 and 90 in (2), (3) and (4)

respectively. This shows that during grain filling an important role is played by the leaves and empty glumes. With regard to the accumulation in the grain of carbohydrates and nitrogenous substances, it is shown that (2) lowers N content and this indicates that N is translocated from the leaves to the grain in relatively greater quantities than from other organs. However, (3) produces an increase in N content of the grain which reaches or surpasses that of the control. This apparent anomaly is explained by the fact that shading restricts assimilation of CO_2 and the accumulation of carbohydrates in the grain ; consequently absolute grain weight is lowered, the relative proportion of N being thus increased. It is concluded that, compared with the leaves, the empty glumes supply the grain with a greater proportion of carbohydrates than of nitrogenous substances. From supplementary experiments described, there is evidence that (a) a relatively larger amount of N is translocated to the filling grain from the older, lower leaves than from younger, upper leaves ; and (b) leaves and empty glumes contribute from 15 to 25% of the substances in the grain, the remaining 75–85% being supplied by other organs, e.g. stems and leaf-sheath.—M.H.

473 Scott, G. E. and others. **Development of the hard red winter wheat kernel in relation to yield, test weight, kernel weight, moisture content and milling and baking quality.** *Agron. J.* 1957, **49,** No. 9, 509-13, bibl. 11, illus. [Kansas Agric. Exp. Sta., Manhattan]

The studies reported were made during 1948–52 on Pawnee wheat and, in 1953 and '54, on the Triumph and Red Chief varieties. Grain was harvested at 11 days after the half-bloom stage and on every other day thereafter until maturity. The mean yield of Pawnee increased steadily from 5·8 bu. per ac. at the 11th day after half-bloom, up to 33·6 bu./ac. at the 29th day and decreased to 31·1 bu./ac. on the 31st day after half-bloom. Germination percentages in the laboratory increased progressively from 89% at the 11th day, to 94% at the 31st day ; in the field, respectively percentages were 78 and 88. Immature seed germinated rapidly but had relatively poor seedling vigour and seed storage life. The dry weight of individual kernels increased slowly up to the 11th day after pollination, but thereafter increased rapidly up to the 27th day after pollination, when the grain was considered to be physiologically mature. The maximum dry weight of 39·4 mg. per kernel was reached when the moisture content of the grain was about 40%. Protein quality reached an optimum at 10–14 days before the grain was suitable for combine harvesting, and thereafter declined slightly.—P.J.B.

474 Singh, H. G. **Mineral and protein content of wheat grain as influenced by variety, soil and fertilizer.** *Diss. Abstr.* 1957, **17,** No. 7, 1441. [Ohio State Univ., Columbus]

To study factors affecting baking quality in wheat, determinations were made of the P, K, Mg, Ca, Na, Fe, Zn, Cu, Si and protein content of the varieties Pawnee, Seneca, Butler and Cornell 595, grown under 8 NPK-fertilizer treatments at 2 locations in Ohio in 1953. The grain of Pawnee had significantly higher Ca and lower K contents than the other varieties, while Cornell 595 had the highest K and lowest Fe and Na contents. It was concluded that there was no rigid genetic control limiting the uptake of given elements, though genetic factors apparently had a significant effect on mineral uptake and translocation. Such varietal differences in mineral composition were thought to be responsible, in part, for differences in baking quality.—P.J.B.

475 Singh, R. and others. **Nicotinic acid content of wheat as influenced by variety and locality.** *Indian J. agric. Sci.* 1956, **26,** No. 4, 381–9, bibl. 21. [Indian Agric. Res. Inst., New Delhi] [Received August, 1957]

For the same variety, nicotinic-acid content was higher in wheats from alluvial soil than from those grown in black- and red-soil zones. The difference was statistically significant.—D.B.

476 Patterson, F. L. and others. **Lodging by node-bending in wheat and barley.** *Agron. J.* 1957, **49,** No. 9, 518–9, bibl. 2. [Purdue Univ. Agric. Exp. Sta., Lafayette, Indiana]

Observations are made on a type of lodging caused by bending at the nodes in wheat and barley plants grown in Indiana. This type of lodging appeared to be genetically conditioned and to be the result of the softening of dead-ripe nodes in nearly-ripe plants by rain-soaking.—P.J.B.

477 Pauli, A. W. **Protein and carbohydrate relationships in winter wheat as influenced by mechanical injury.** *Diss. Abstr.* 1957, **17,** No. 7, 1440–1. [Kansas State Coll., Manhattan]

The studies reported relate to simulated lodging injury and removal of leaf blades.—P.J.B.

478 Gott, M. B. **Vernalization of green plants of a winter wheat.** *Nature, Lond.* 1957, **180,** No. 4588, 714–15, bibl. 8. [Bot. Sch., Univ. Melbourne]

An experiment made with the Australian winter wheat, Winter Minflor, shows that this variety is capable of being vernalized at any stage from just-germinated seed to a 6-weeks-old plant with 6–7 leaves on the main shoot. There is indication that the older the plant, the shorter the period of cold treatment necessary for complete vernalization. [See also *Fld Crop Abstr.* 9 : 1099.]—M.H.

479 Schmalz, H. Untersuchungen über den Einfluss von photoperiodischer Induktion und Vernalisation auf die Winterfestigkeit von Winterweizen. [**The effect of photoperiodic induction and vernalization on winter-hardiness of winter wheat.**] *Z. PflZücht.* 1957, **38**, No. 2, 147–80, bibl. 92, illus. [Inst. PflZücht, Martin-Luther-Univ., Halle-Wittenberg, E. Germany]

480 Sandhu, A. S. **Drought resistance in wheat and some associated morphological and physiological traits.** *Diss. Abstr.* 1957, **17**, No. 2, 211. [Kansas State Coll., Manhattan]

There appeared to be a close correlation between resistance to heat and to drought in wheat plants. Varieties with resistance to drought and heat had a greater proportion of dry weight of roots to tops than did non-resistant varieties, a relation that persisted from early- to late-growth stages. The rate of tissue-drying in excised plants was lowest in resistant plants. There appeared to be no relation between transpiration ratio and drought resistance. Plants were most tolerant of heat when previously subjected to cold treatment. Varieties most winterhardy were also most tolerant of heat. —P.J.B.

481 Jeremias, K. Zur Physiologie der Frosthärtung. (Unter besonderer Berücksichtigung von Winterweizen.) [**On the physiology of frost-resistance (particularly with regard to winter wheat).**] *Planta* 1956, **47**, No. 1, 81–104, extensive bibl., illus. [Bot. Inst. Tech. Hochschule, Stuttgart, and Inst. Landw. Bot., Univ. Bonn]

The endosperm of hardy varieties of wheat had a higher carbohydrate content than that of the frost-sensitive controls. The ribose content of several hardy and susceptible varieties and the effects of light and darkness on resistance were also studied. Generally, resistance was shown only by plants grown in the light. Plants fed with *d*-ribose were more frost-resistant than the controls.—M.P.

482 Norfolk Agricultural Station. Great Britain. **Seed-rate and nitrogen for spring wheat.** *Rep. Norfolk agric. Sta.* 1957, 9–10.

Trials at Sprowston from 1953–6 with Atle spring wheat, showed that narrow row-spacing (4 in.) combined with heavy seed rates (up to 3·5 bu./ac.) and heavy N-manuring (6 cwt. nitrochalk/ac.) produced no gain compared with normal practice. The use of 8-in. row-spacing, a seed-rate of 2·5 bu./ac. and N at 4 cwt. nitrochalk/ac. is recommended as most profitable. Splitting the seed-dressing between the seed-bed and a May top-dressing showed no significant advantages over applying all to the seed-bed.—M.P.

483 Anant Rao, N. K. and others. **Response of three different varieties of wheat to three sources of nitrogen in three different doses and their interaction with three levels of irrigation.** *Ind. J. Agron.* 1957, **1**, No. 4, 255–62, bibl. 3. [Balwant Rajput College, Agra]

The average results for the main effects revealed : Pb. 591 to be the best variety, 60,000 gal. of water per ac. per irrigation to be the optimum level of irrigation, castor cake and ammonium sulphate to be more effective sources of N than farm compost, and 30 lb. per ac. to be the optimum dose of N.—From authors' summary. D.B.

484 Papavizas, G. C. and Christensen, C. M. **Grain storage studies. 25. Effect of invasion by storage fungi upon germination of wheat seed and upon development of sick wheat.** *Cer. Chem.* 1957, **34**, No. 5, 350–9, bibl. 13, illus. [Univ. Minnesota, Minneapolis]

Hard, red, spring-wheat seed free from storage fungi and seed inoculated with *Aspergillus candidus*, *A. repens* and *A. restrictus* was stored under different moisture conditions for periods of 2 weeks to 7 months. Fungus-free seed with moisture contents ranging from 14·7% to approximately 20%, stored for 7 months, showed little or no loss of germination, while damage to the wheat germ in inoculated seed was marked after storage for a few weeks. It was concluded that the fungus species used in these trials were a common cause of so-called " sick wheat" during storage.—P.J.B.

485 Hubbard, J. E. and others. **Moisture relations in wheat and corn.** *Cereal Chem.* 1957, **34**, No. 6, 422–33, bibl. 17, illus. [N. Utilization Res. and Devel. Div., Peoria, Illinois]

Hysteresis loops, caused by differences in the hygroscopic capacity of grain under rising and falling humidity gradients, were established for wheat and maize at 25°, 30°, and 35°C. over the range 0–97% relative humidity. Both desorption and adsorption isotherms for wheat and maize were found to be sigmoid. The maximum hysteresis effect was found to be 1·6% between 12 and 44% humidity, diminishing to less than 0·2% at 92% humidity. No consistent differences were found in the extent of hysteresis with temperature changes over the range of temperatures studied. Hygroscopic capacity of grain showed a negative correlation with temperature. A rise in temperature of 10°C. lowered the equilibrium moisture content by as much as 1·3%.—From authors' summary. R.B.

OATS

See also Abs. 539

486 Casady, A. J. and others. **Oats in Kansas.** *Bull. 386 Kansas Agric. Exp. Sta.* 1957, pp. 31, illus.

Topics reviewed include : the history of oat cultivation in Kansas, currently-grown varieties, and recommended cultural practices. Data are given of the annual and average grain yields during 1947–55 of the recommended varieties Kanota, Nemaha, Cherokee, Andrew and Mo. 0–205.—P.J.B.

487 Wiggans, S. C. and Frey, K. J. **Tillering studies in oats. 3. Effect of rate of planting and test weight.** *Agron. J.* 1957, **49,** No. 10, 549–51, bibl. 9. [Iowa Agric. Exp. Sta., Ames]

Fewer grain-producing culms per plant were produced as the seed rate was increased.—From author's summary. R.B.

488 Pendleton, J. W. **Effect of clover, row spacing, and rate of planting on spring oat yields.** *Agron. J.* 1957, **49,** No. 10, 555–8, bibl. 5, illus. [Ill. Agric. Exp. Sta., Urbana]

Intersowing Newton spring oats with red clover increased the test weight of the crop but reduced grain yield. Oats sown lightly in clean-cultivated 32-in. rows returned a crop of 190 bu. per bu. of seed sown, compared with 42 bu. from seed sown in 8-in. rows intersown with clover. Reduction in yield due to presence of clover increased as row width increased.—From author's summary. R.B.

489 Wild, A. S. and Reeves, J. T. **Oat trials and usage in the wheatbelt, 1956.** *J. Dep. Agric. W. Aust.* 1957, **6,** No. 5, 551–63, bibl. 4, illus.

The performance of oat varieties grown for grazing, hay and grain in Western Australia is reported.—M.P.

490 Herrmann, P. Chemische Mittel gegen die Fritfliege. [**Chemical substances for control of frit fly.**] *Bayer. Landw. Jb.* 1957, **34,** No. 3, 357–69, bibl. 7, illus. [Bayer. Landessaatzuchtanstalt, Weihenstephan, Bavaria]

Results are given of factorial experiments, carried out over several years, to test the effectiveness of hortex, systox and E605 for the control of frit fly [*Oscinella frit*] on oat varieties. Treatment towards the end of April with E605 or systox was successful in all trials and on all varieties, resulting in increases of grain and straw without affecting grain quality. Hortex was successful only when used on the extremely susceptible variety Siegeshafer.—D.B.

491 Kent, N. L. and Hutchinson, J. B. **The effect of MCPA and 2:4-D herbicides on the quality of spring oats for milling and provender feeding.** *Ann. appl. Biol.* 1957, **45,** No. 3, 481–8, bibl. 8. [Res. Assoc. Brit. Flour-Millers, St. Albans, Herts]

MCPA applied to oats at the 1- to 2-leaf stage had slight effects on grain quality, whereas 2,4-D at this stage generally increased kernel weight, husk-ash content, and content of abnormal grains, and decreased the grain yield. Applied at the 4- to 5-leaf stage, 2,4-D also increased kernel-nitrogen content and decreased kernel-oil content. Effects were enhanced as the dosage increased. Yielder and Craigs Afterlea were most susceptible to 2,4-D at the 4- to 5-leaf stage and Sun II, a relatively resistant variety, at the 6- to 7-leaf stage. —Authors' summary. M.H.

492† Stenuit, D. and Piot, R. La magnésie, élément essentiel de l'alimentation des plantes. [**Magnesium, an essential element in plant nutrition.**] *Rev. Agric., Brux.* 1957, **10,** No. 7–8, 895–914, bibl. 9, illus. [Serv. Pédol. de Belgique, Heverlée]

An account is given of pot and field trials to study the influence of magnesium deficiency on growth, yield and chemical composition of oats. The application of magnesium sulphate to oats on magnesium-deficient soils increased average yields by 20% grain and 9% straw.—E.B.O.

RYE

493 Gorlitz, H. Der Einfluss des Überhütens auf Entwicklung und Ertrag des Wintergetreides. [**The influence of top-grazing on the development and yield of winter cereals.**] *Z. Acker- u. PflBau* 1957, **103,** No. 3, 347–58, bibl. 11. [Inst. Acker- u. PflBau, Univ. Rostock, E. Germany]

The grazing of 15-cm.-high winter-rye by sheep in spring resulted in a 20% decrease in grain yield. The maintenance of grain yields after grazing in autumn and early winter could not be relied on because the effect of grazing was largely dependent on subsequent winter weather. Losses in grain yields could be made good by the application of 40 kg. N/ha. Grazing of rye is recommended only when the stand is so dense that it needs thinning. Barley grazed in autumn died out during winter. The treading by the sheep did not consolidate the ground sufficiently to dispense with rolling.—D.B.

494 Koopman, C. Acht jaar vergelijkende proeven met Petkuser en Dominant. [**Eight years' comparative trials of Petkus and Dominant.**] *Meded. Cent. Bur., Rotterdam* 1957, **41,** No. 9, 150, illus. [Hoofddorp]

Of the two varieties of winter rye, the mean yield of Netherlands-bred Dominant exceeded that of Petkus in each of the 8 years of trial except one. The relative figures for the 8 years and for 133 trial plots are Dominant, 102·3 and Petkus, 100. —G.M.R.

495 Instituut voor Rassenonderzoek van Landbouwgewassen, Wageningen. Bericht over rassenkeuze No. 231. Winterrogge, 1957. [**Choice of varieties. Pamphlet No. 231. Winter rye, 1957.**] *Suppl. 14, Landb Voorl.* 1957, **14,** No. 9, 1–2.

Of the ordinary (diploid) varieties, Petkus, which is successful on all soil types, is the winter rye most generally grown in the Netherlands, but the variety Dominant has recently gained in popularity, especially on the peat lands, and gives a somewhat higher yield. Heertvelder is more resistant to eelworm. The grain and straw yield obtained from these 3 standard varieties, together with 4 new varieties, tested in the inter-provincial trials from 1951–7 are tabulated. Short descriptions are given. Tetraploid varieties included in the trials were the German Tetra and the Dutch Vadetra. These two resemble one another closely and give approximately the same yield both of grain and straw. They cannot be grown in the vicinity of the ordinary diploid varieties. Compared with the diploids, their advantages are more rapid development in spring and stiffer straw ; disadvantages mentioned are little adaptability to poor conditions, susceptibility to rust, longer straw and later ripening.—G.M.R.

496 Scheffer, F. and others. Die Phosphorsäureaufnahme junger Roggenpflanzen aus ^{32}P-haltigem organischen Material. [**Phosphoric-acid absorption by rye seedlings from organic material containing ^{32}P.**] *Z. PflErnähr. Dung.* 1957, **77,** No. 3, 223–9, bibl. 11. [Univ. Göttingen, W. Germany]

The results of the experiments with labelled P showed that, contrary to current opinion, P was absorbed by the plant from organic material to the same extent as from inorganic fertilizers.—D.B.

BARLEY

See also Abs. 476

497 Glynne, Mary D. and Slope, D. B. **The effect of seed rate and nitrogen on lodging and yield of spring barley (field experiments 1954 and 1955).** *J. agric. Sci.* 1957, **49,** Pt 4, 454–8, bibl. 8, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

In trials with spring-sown Proctor barley, seed rates of 1, 2 and 3 bu./ac. (R1, R2, R3) were used in combination with 1·5, 3 and 4·5 cwt. ammonium sulphate/ac. (N1, N2, N3) applied as a top-dressing at sowing. Lodging began in early July of both years ; in the wet, cold year of 1954, an average of 92% of the crop was lodged just before harvest, compared with 19% in 1955, a warm, dry, year. The response of lodging to seed rate and manurial treatment was similar in both years but differed in rate and extent. In 1954, though treatments had little effect on the final area lodged they had a considerable effect on the date of lodging. The date by which 50% of the crop became lodged was earlier in R3 compared with R1 by 8 days at N1, 14 days at N2 and 21 days at N3. Plants from stands sown at 3 bu./ac. produced only 35 and 28% more ears than those sown at 1 bu./ac. in 1954 and '55, respectively. The results show that though the effect of seed rate on lodging may depend partly on an increase in stem numbers, the effect of N does not. The weight per unit length of the basal part of the stems decreased consistently as seed rate increased ; the effect of N was smaller and less consistent. Total grain yields were not markedly affected by treatments. The yield of dressed (1st quality) grain was decreased by the higher seed rates in 1955 and by N-treatment in both years.—C.L.S.

498 Kooi, I. and Nijdam, F. E. **On recognising barley varieties.** *Meded. Inst. Rassenonderz. Landb., Wageningen* 1957, No. 33, pp. 24, bibl. 7, illus.

A method for identifying varieties of malting barley on the basis of grain characteristics is described.—R.B.

499 Hörberg, Y. Weibulls Original Ingridkorn. [**Weibull's Original Ingrid barley.**] *Weibull's Årsb.* 1957, Autumn, 3–4.

Notes are given on a new spring-barley variety, Ingrid, which is to be released in the spring of 1958. In trials during 1950–5, in Central and Southern Sweden, its yield was similar to that of Rika ; it outyielded Herta, Ymer and Carlsberg II by 2·1, 1·2 and 2·4%, respectively. Ingrid is earlier maturing and more stiff-strawed than Rika and Herta and therefore more suitable for combine-harvesting. It is superior in malting qualities to both Rika and Herta.—J.K.L.

500 Zweifel, J. Les orges d'automne, les orges de printemps et les orges de brasserie. [**Winter-, spring- and brewing-barleys.**] *Rev. rom. agric.* 1957, **13,** No. 9, 65–8, bibl. 14, illus. [Sta. Féd. d'Essais Agric., Lausanne, Switzerland]

An account is given of the cultivation areas and the varieties used in Switzerland. [See also Abs. 62.]—D.B.

501 European Brewery Convention. **Report of the Barley Committee. European Brewery Convention. Trials 1956.** Rotterdam, 1957, pp. 110, illus.

Full results of the trials carried out in 12 countries are tabulated and described. Results in general tended to confirm those of the previous year. [See *Fld Crop Abstr.* 10 : 453.] Carlsberg again gave the highest yield in nearly all trials ; its N-content was the lowest of all the varieties, but its malting qualities were not wholly satisfactory.

Proctor also yielded well, was stiff-strawed and had good malting properties, but in nearly all countries it was dormant. Domen's outstanding qualities and other favourable agricultural features were confirmed. Of the optional varieties, Ingrid showed most promise.—M.P.

502 Banasik, O. J. **Malting qualities of North Dakota barley varieties.** *Bi-mon. Bull. N. Dak. Agric. Exp. Sta.* 1957, **20,** No. 2, 26–30, bibl. 4.

The barley varieties Kindred and Montcalm were found suitable for malting and brewing. Husky, Tregal and Vantage were unsuitable. The best barley was produced in the Red River Valley and northern N. Dakota. Barley from the Williston, Dickinson and Edgeley areas had the highest diastatic power.—R.B.

503 Harpstead, D. D. **Liberty barley.** *Bull. 462 S. Dakota Agric. Exp. Sta.* 1957, pp. 4.

Liberty is a new 6-rowed mid-season variety. In trials during 1953–6 at 5 locations in S. Dakota, it consistently outyielded the Traill, Kindred, Plains and Odessa varieties. It is resistant to prevalent races of stem rust [*Puccinia graminis hordei*] and mildew [*Erysiphe graminis*].—P.J.B.

504 Schlehuber, A. M. and others. **Rogers winter barley.** *Bull. B-490 Okla Agric. Exp. Sta.* 1957, pp. 12, illus.

The new 6-row barley variety Rogers is high-yielding, stiff-strawed and resistant to mildew. It is medium to mid-late in maturity and has a high test weight.—J.F.C.

505 Sierra, J. A. Avances del mejoramiento de cebada en Colombia en 1956. [**Progress in barley improvement in Colombia in 1956.**] *Agric. trop., Bogotá* 1957, **13,** No. 7, 433–47, illus.

In 1956 the new barley variety Funza yielded about 20,000 tons of grain from 9000 ha. This production was obtained from 2 crops, one in March-August, which gave the greater amount as climatic conditions are most favourable in that season, and one in September-January. Funza is satisfactory for both malting and brewing.—E.B.O.

506 Caldwell, F. **Overcoming dormancy in undamaged and damaged barley harvested in 1956.** *J. Inst. Brew.* 1957, **63,** No. 4, 340–4, bibl. 6, illus. [Nat. Inst. Agric. Engng, Silsoe, Beds, England]

Samples of Proctor barley were subjected to the following treatments to overcome dormancy : (a) soaking in 50% (v/v) aqueous H_2SO_4 for 3 hr. at 21°C., (b) chilling on a moist substrate for 3 days at 5°C., (c) acid treatment, followed by chilling, (d) chilling, followed by acid treatment. The dormancy of untreated grain was very marked. Treatments (a) and (b) both greatly increased germination. Treatment (d) was very lethal to the grain. Treatment (c) resulted in rapid and complete germination of undamaged grain. In further tests, samples of grain that had been exposed to 3 degrees of harvest damage were subjected to the above treatments. The acid treatments reduced the germination of grain subjected to severe harvest treatment, but not that of gently-harvested samples. The difference between the germination of undamaged grain and that subjected to harvest damage, where both were assessed by treatment (c), afforded a measure of the incidence of harvest injury. Where the grain was emerging from the period of dormancy, there were no significant differences between treatments (a), (b) and (c), though treatment (c) gave the highest germination percentages, except in the case of samples subjected to severe harvest injury.—P.J.B.

507 Böning, K. and Wagner, F. Erfolgreiche Versuche über eine chemische Bekämpfung des Gerstenflugbrandes (*Ustilago nuda* [Jens.] *Rostr.*). [**Successful experiments in the chemical control of loose smut of barley.**] *Angew. Bot.* 1957, **31,** No. 5, 197–209, bibl. 15. [Bayer. Landesanst. PflBau und PflSchutz, München, W. Germany]

Results are given of a chemical seed-treatment for loose smut of barley (but at present not of wheat). This was a chance discovery within another series of experiments and the name of the chemical is being withheld until precise recommendations can be made for its application. For the present, the main interest lies in its advantages over the hot-water treatment : (1) either an immersion or sprinkling procedure can be used ; (2) the period of treatment is for 3–5 hr. only ; (3) the treatment is effective at room temperature ; (4) drying is not necessary ; (5) other organisms e.g. *Helminthosporium* spp. and *Fusarium* spp. are also killed.—D.B.

508 Day, A. D. **Effect of lodging on yield, test weight, and other seed characteristics of spring barley grown under flood irrigation as a winter annual.** *Agron. J.* 1957, **49,** No. 10, 536–9, bibl. 9, illus. [Arizona Agric. Exp. Sta., Tucson]

The effects of 45° and 90° artificial lodging at heading, and at 10 and 20 days after heading on yield, test weight, 1000-grain weight, plump and thin kernels, and colour-brightness index of winter-sown, irrigated spring-barley grown at Tucson, were investigated. Grain yield decreased 50% in some instances, as a result of lodging of the stems 90° from the vertical, after heading. Test weight in both Atlas 46 and Hannchen barley was severely decreased, and the 1000-grain weight reduced, by 90°-lodging induced at all stages of growth. The percentage of plump kernels in the grain decreased, and the percentage of thin kernels increased, as a result of severe lodging during the

period from heading to maturity. The colour-brightness index of the grain decreased as a result of lodging at all stages of treatment, less from 45°- than from 90°-lodging.—From author's summary. R.B.

509 Collier, D. and others. Cinquième année d'expérience en cases de végétation de la Station d'Agronomie du Massif central, essais sur orge de printemps. [**Fifth year of trials in vegetation tanks at the Agronomy Station of the Central Massif (France); trials with spring barley.**] *C.R. Acad. Agric. Fr.* 1957, **43,** No. 12, 664–70, bibl. 1.

The results from the trials described confirmed that in the sub-continental climate of Limagne, in soils with no subsoil water, deficiency of water at shooting reduces the efficacy of N-manuring and lowers cereal yields. Irrigation applied before tillering, and especially before shooting, would increase yields considerably. In the black soils of Limagne, which have a high capacity for retaining water, irrigation could be applied early, at a time when water is abundant. [See also *Fld Crop Abstr.* 8 : 1212.]—From authors' conclusions. E.B.O.

510 Williams, D. E. and Vlamis, J. **The effect of silicon on yield and manganese-54 uptake and distribution in the leaves of barley plants grown in culture solutions.** *Pl. Physiol.* 1957, **32,** No. 5, 404–9, bibl. 7. [Soils and Pl. Nutr. Dep., Univ. California, Berkeley]

511 Kinebuchi, M. and others. **Studies on sterility in lower spikelets of barley. 2. On the environment causing the sterility and on its control.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26,** No. 1, 33, illus. [Hokuriku Agric. Exp. Sta.]

The number of sterile spikelets increased with early sowing (25 Sept. rather than 20 Oct.) and under environmental factors such as high temperature, shade, long-day, drought and high soil-moisture content. A top dressing of N applied 15–7 days before heading, favoured normal development of the spikelets.—From English summary. D.B.

512 Moës, A. L'action de la cystéamine chez l'orge. [**The effect of cysteamine on barley.**] *Bull. Inst. agron., Gembl.* 1957, **25,** No. 1–2, 98–107, bibl. 13.

Barley seeds and seedlings treated with cysteamine (β mercaptoethylamine) showed that, depending on the concentration used, cysteamine : reduced dormancy ; had a toxic effect, thus reducing the germination percentage and inhibiting seedling growth ; when applied before irradiation, protected the grains from the toxic effect of X-rays.—E.B.O.

513 Sandhu, R. S. **Mutagenic effects of 2,4-D in barley and wheat.** *Diss. Abstr.* 1957, **17,** No. 7, 1450. [Univ. Minnesota, Minneapolis 14]

Applications of 2,4-D amine and ester to barley and wheat plants at 2 different growth stages resulted in no significant increase in meiotic irregularities.—P.J.B.

514 Ouang, T. Y. and Huang, T. C. **Research on the improvement of the quality of barley.** [Chinese] *J. Agric., For.* 1956, **5,** 1–15. [Formosa, (Taiwan)] [Received Jan., 1958]

MAIZE

See also Abs. 485

515 Sasso, G. Prove di cimatura e sfogliatura su mais ibridi e nostrani. [**Trials on topping and stripping hybrid and local maizes.**] *Agricoltura ital.* 1956, **56,** 225–32, bibl. 2. [Ist. Agron., Univ. Torino, Italy]

The results from 2 trials in Piedmont indicated that topping and stripping of maize reduced grain yields more in the hybrids, as a whole, than in the local varieties, particularly under conditions of high productivity. [See also *Fld Crop Abstr.* 2 : 1170.]—E.B.O.

516 Sasso, G. Ricerche sulla distribuzione dell'acqua irrigua per aspersione e per infiltrazione nella coltura del mais. [**Investigations on the distribution of irrigation water by sprinkling and infiltration in maize cultivation.**] 1957, pp. 63–76, bibl. 3, illus., English, French and German summaries. [Sez. Agron., Cent. Naz. Mec. Agric., Torino, Italy]

In a trial in Piedmont, Italy, in 1956 on permeable soil, sprinkler irrigation was compared with furrow irrigation (lateral infiltration) using the maize varieties Funk's G.77 (very susceptible to soil-moisture conditions) and Marano Vicentino. Two amounts of irrigation water per application were tested : 150 and 300 cu. m./ha., and 3 applications were given (30 July, 9 and 21 August). The results showed that : (a) sprinkler irrigation is suitable for maize ; in the higher rate tested it was better than furrow irrigation, the grain yield of Funk's G.77 being about 30% more with sprinkler irrigation than with furrow irrigation ; at the lower rate furrow irrigation was better than sprinkler irrigation but, on the whole, the higher rate gave the highest yields ; (b) there were no significant differences from applying irrigation water to all the furrows or to alternate ones.—E.B.O.

517 Laird, R. J. and others. Maíz de temporal asociado con trébol Hubam. [**Maize grown in the rainy season (in Mexico) in association with Hubam clover.**] *Agricultura téc., Méx.* 1957, No. 4, 2–3, illus. [Sec. Agric. Ganad., Mexico]

The maize is drilled in furrows and after the

first cultivation, Hubam clover (*Melilotus* sp.) is broadcast between the furrows. The maize yield is almost equal to that obtained by the usual method, while Hubam clover yields about 120 kg. N/ha. in the form of green manure.—From authors' summary. E.B.O.

518 Garber, —. Der Maisanbau und seine Grenzen. [**Maize cultivation and its territorial limits.**] *Dtsch. landw. Pr.* 1957, **80,** No. 50, 497–8, illus. [StaatsInst. Angew. Bot., Hamburg]

As a result of 4 years' experience (1954–7) the following varieties are recommended for the climate of S. Schleswig Holstein : Caldera 131 (very early-maturing), Caldera 331, Prior, Goudster, CIV 6, Wisconsin 255, and the Peragis-bred strains HD and HR.—D.B.

519 Fenaroli, L. Sementi di mais. [**Maize seed.**] *Sementi elette* 1956, **2,** No. 4, 15–19, illus., English and German summaries. [Received Feb., 1958]

The maize hybrids available on the Italian market in 1956 are listed.—E.B.O.

520 Gueit, —, and others. Expérimentation agricole. Maïs grain. [**Agricultural trials. Grain maize.**] *Rev. agric. Afr. N.* 1956, **54,** No. 1908, 191–3. [Serv. Exp., Algeria]

In trials at Maison-Carrée Station with late maize varieties grown under irrigation, Kansas 1859 yielded best with 4130 kg./ha. At Isserville Station, where maize grown without irrigation was affected by pests and heavy rains, U.41 yielded best with 2380 kg./ha. [See also *Fld Crop Abstr.* 10 : 1295.]—E.B.O.

521 West African Maize Research Unit. **1954 and 1955 trials.** *Publ. Nigeria Dep. Agric.* 1957, pp. 53, illus.

A number of maize variety-, introduction- and hybrid-trials was carried out during 1954 and '55 in Nigeria and Ghana, and a variety- and an introduction-trial in Dahomey and Sierra Leone. Results of the trials are fully tabulated. The data obtained are discussed with reference to qualitative differences between localities. Three major zones in the production of maize varieties are recognized : the savannah, secondary forest and rain-forest zones.—M.P.

522 Costa-Rodrigues, L. Milhos sacarinos. 2. Ensaios de adaptação. [**Sugar maize. 2. Adaptation trials.**] *Agron. lusit.* 1957, **19,** No. 1, 57–69, bibl. 3, English summary.

An account is given of trials in Oeiras, Portugal, and S. Miguel Island, Azores, in 1956, to test 79 maize hybrids for yield of grain and forage, and for sugar content of the stalks. The intention is to use sugar maize for alcohol production.—E.B.O.

523 Staniforth, D. W. **Effects of annual grass weeds on the yield of corn.** *Agron. J.* 1957, **49,** No. 10, 551–5, bibl. 9. [Iowa Agric. Exp. Sta., Ames]

Maize-yield reductions resulting from yellow foxtail [*Setaria lutescens*] infestations averaged 14, 10 and 5 bu./ac., respectively, after applications of 0, 70 and 140 lb. N/ac. Maize competed with foxtail more successfully at higher N levels, yields being increased 2–3 times more than yields of foxtail seed. Possible effects of uncontrolled factors are recognized.—From author's summary. R.B.

524 Swaine, G. **The maize and sorghum stalkborer, *Busseola fusca* (Fuller), in peasant agriculture in Tanganyika Territory.** *Bull. ent. Res.* 1957, **48,** No. 4, 711–22, bibl. 9, illus. [Dep. Agric., Tanganyika]

Cultural control by burning the crop residues is not practicable in peasant agriculture. Chemical control of the first generation of *Busseola* in young maize can be achieved by applying a 2·5% DDT dust in the funnel of the plant. In 13 trials on peasant-owned plots at Mbeya, in which this preparation was applied 4 times, at weekly intervals, beginning about 18 days after germination, at the rate of 10 lb./ac., the average weight of maize cobs from 100 plants was increased from about 12 to 23 kg.—From author's summary. E.B.O.

525 Loomis, R. S. and others. **The European corn borer, *Pyrausta nubilalis* (Hubn.), and its principal host plant. 5. A chemical study of host plant resistance.** *Pl. Physiol.* 1955, **32,** No. 5, 379–85, bibl. 27. [Bot. and Entomol. Dep., Univ. Wisconsin, Madison]

526† Smithers, C. N. **The recent outbreak of ladybird (*Epilachna similis Thb.*) on maize in Southern Rhodesia.** *Rhod. agric. J.* 1957, **54,** No. 4, 332–6, bibl. 2, illus.

Epilachna similis, which attacks maize, oats, wheat, sorghum, barley, *Pennisetum purpureum, Eleusine indica* and some pasture grasses, was adequately controlled by 19·5% dieldrin emulsion at 12 gal./ac., 40% toxaphene wettable powder at 4 lb./ac., and 50% malathion at 1·5 pt. emulsifiable concentrate per ac. Thorough spraying of the under surface of the leaves is essential.—M.P.

527 Farmer's Weekly. South Africa. **Cause of yellowing of maize discovered.** *Fmrs' Wkly, S. Afr.* 1957, July 10, 27.

Yellowing of maize is caused by Zn-deficiency and may be cured by applying 20–30 lb. Zn SO_4 /morgen [1 morgen = 2·116 ac.] in the row at sowing.—From *Soils and Ferts* 20 : 2234.

528 Innamorati, M. Vernalizzazione e "tenerizzazione" nel *Triticum durum,* Desf. [**Vernalization and " yellow berry " in *T. durum.***

Ric. sci. 1957, **27**, No. 9, 2711–26, bibl. 42, illus. [Ist. Bot., Univ. Perugia, Italy]

The trials described were carried out with 2 autumn durum wheats, Bidì and Cappelli both from Italy, and a spring variety, Amharai Zellim Cerù from Eritrea. From each variety, completely hard seeds, and completely soft seeds (yellow berries), were selected. Results in general indicated that : (a) the soft seeds of the autumn varieties produced plants which had a more marked autumn character (longer vegetative cycle) than those obtained from the hard seeds ; this effect was not shown by the spring variety ; (b) the autumn varieties had a greater percentage of soft seeds than the spring variety.—E.B.O.

529 Nichols, C. W. and Stout, G. L. **Witchweed, *Striga asiatica*, a green, seed-producing, higher plant parasitic on corn [maize] and certain other crops.** *Bull. Dep. Agric. Calif.*, 1957, **46**, No. 3, 236–41, bibl. 6, illus. [Calif. Dep. Agric., Sacramento]

Greenhouse tests have shown *Striga asiatica* is capable of attacking 12 commonly grown grain crops and grasses. A full list of its hosts is given. *Vigna sinensis* and *Glycine soja* crops stimulate the germination of *S. asiatica* seeds, but do not act as hosts. Control of *S. asiatica* can be achieved by growing a grain crop on infested land and ploughing it in before the parasite flowers. Applications of 2,4-D at 1 lb./ac. or dinoseb at 2 lb./ac. kill this weed.—R.B.

530 Lanza, F. Metodologia e fattori influenti nel controllo a freddo (cold test) della germinazione del mais. [**Methodology, and influencing factors, in the cold test for maize germination.**] *Maydica* 1957, **2**, No. 4, 114–34, bibl. 12, illus.

531 Fayemi, A. A. A. **Evaluation of techniques for studying root development of corn (*Zea mays* L.) plants.** *Diss. Abstr.* 1957, **17**, No. 8, 1642. [Kansas State Coll., Manhattan]

Techniques investigated and found to have value for root-development studies included : (a) differential wetting of the soil in pots in which plants are grown with a regulated water supply, (b) soil zoning, in which different soil levels are partitioned-off horizontally by layers of paraffin, (c) studies of seedlings grown in 7-in. clay pots, and (d) the use of the glass chamber, in which root development is studied visually through a glass window placed vertically. The soil-depth method, in which seedlings are grown in cans and the time taken for their roots to reach the bottom is recorded, was of no value. There were indications that root growth could be followed by placing herbicides or phytotoxic materials at given depths in the soil ; a reaction in the above-ground parts of the plants indicated when the roots had reached the applied materials.—P.J.B.

532 Peters, D. B. **Water uptake of corn [maize] roots as influenced by soil moisture content and soil moisture tension.** *Proc. Soil Sci. Soc. Amer.*, **21**, No. 5, 481–4, bibl. 5, illus. [Illinois Agric. Exp. Sta., Urbana]

533 Gingrich, J. R. and Russell, M. B. **A comparison of effects of soil moisture tension and osmotic stress on root growth.** *Soil Sci.* 1957, **84**, No. 3, 185–94, bibl. 5. [Univ. Illinois]

Growth responses of seedling maize roots were measured under 7 soil-moisture tensions and osmotic stresses, in combination with 5 O_2-concentrations. In the absence of other limiting factors, radicle elongation, increase in fresh weight and hydration decreased with increasing soil-moisture tension or osmotic stress over tensions of one-third to 12 atm. Dry-weight increases declined progressively as soil-moisture tension increased, but were not affected by osmotic stress, even when O_2 was not limiting. The effect of O_2-concentration depended on the moisture stress. Growth characteristics influenced by osmotic stress responded linearly throughout the range of tensions used. When O_2 was not limiting, growth, as a function of soil-moisture tension, was non-linear ; it was sensitive to changes in moisture tension between 1 and 3 atm.—From authors' summary. R.B.

534 Flynn, L. M. and others. **Effects of temperature, rainfall and fertilizer on yields and composition of corn plants, with special reference to toxic nitrate levels.** *Res. Bull. 620 Missouri Univ. Agric. Exp. Sta., Columbia* 1957, pp. 24, bibl. 15. [Received Aug. 1957]

Maize plants, grown during 1951–4 on plots receiving 16, 66, 136 and 266 lb. N/ac., were analysed. In the first 3 years, raising the soil-N level increased protein concentration in the whole plant. The highest level of N doubled the percentage of crude protein in the stover, increased the percentage of protein in the whole plant by one-half, and that in the grain by one-third. In 1954 there was a drought ; no grain was produced and forage samples were high in N, with up to 13% crude protein. Nitrate uptake was higher than protein synthesis and nitrate accumulated at toxic levels, mostly in the stalks, the highest levels occurring in plants from heavily fertilized plots. Irrigation during drought lowered the concentration of both protein and KNO_3 in the stalks.—From authors' summary. R.B.

535 Kornilov, A. A. [**Frost resistance and hardening of maize plants.**] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1957, **114**, No. 5, 1116–19, bibl. 5. [Karaganda Agric. Exp. Sta.]

It has been maintained that maize perishes at −2° or −3° C., but there are also reports that

certain lines of maize will tolerate a spring frost of —4·4° C. when at the 3- to 5-leaf stage. Moreover, in some regions of Siberia where maize is a new crop, it is claimed that the plants tolerate —7° C. During 1955–6 at the above Station numerous experiments with different varieties of maize have thrown light on the problem of selection in maize for frost resistance. In most of the author's tests (described below), the sowings were made with dry seed, but in some variants the seed was pretreated by soaking for 10 days in melting snow, or at temperatures fluctuating between 0° and 15° or 20° C. In the period from sowing/seedling emergence to the formation of the first 3 or 4 leaves, the plants were kept: (a) at day temperatures of 20–30° C. and night temperatures of 15–20°C.; (b) in a greenhouse at 9–12°C. during the day, and 2–5°C. during the night. When the plants attained the 3- to 5-leaf stage, they were hardened for 3 or 4 hr. either under cover or in the open exposed to the cold N.E. wind. Subsequently the plants were kept in a warm room [temp. not stated] for 2 or 3 days; specimens which were untouched by frost (or showed only slight freezing of the first leaves) were considered completely preserved; plants with 2 or 3 frozen leaves were considered damaged, and those which lost their turgor when thawed and which displayed a dying mass above-ground were considered perished, (although they continued growth later in a warm environment). It is emphasized that in most cases when hardened at —4° or —5°C., the plants were distinctly divisible into 2 groups, namely, (a) perished, or (b) completely, or almost completely, preserved; plants at an intermediate stage between (a) and (b) were extremely rare. The plants subjected to the above procedure included 10 varieties from numerous research stations. The first experiment was initiated in the autumn of 1955 with 4 varieties, 3 sowings being made between 25 Aug. and 4 Sept. in containers distributed in "meteorological" plots. The data show that the plants at the 2- to 3-leaf stage are much more resistant to cold than are those in the 4-leaf stage. Among the young plants there were 12 to 30% undamaged by freezing at —3·4°C. in a north-east wind. Further tests were made with plants grown in a greenhouse (to the 3- to 5-leaf stage) (1) at high temperature, under constant light; and (2) at low temperature (after hardening). The plants were kept for 4 hr. at —4°C., (repeated 2 or 4 times during 10–15 days). From a study of more than 1000 specimens, there is evidence that, between varieties, there is a great difference in frost resistance (percentage survivals ranging between 8 and 34 for non-hardened varieties and between 42 and 84 for hardened varieties). However, the difference is more acute between specimens of a single variety which have been hardened and those which have not (e.g. in Bezenčukskaja 41, there were 16% survivals when not hardened and 69% when hardened). Low temperatures are tolerated better by plants grown under cover compared with those exposed to the N.E. winds. This is also confirmed by the author's tests on 9 maize varieties hardened at —4°C. and then subjected (mostly at the 3- to 4-leaf stage) to —5°C. These varieties survived hardening and subjection to —5° in varying degrees (4–100%). It is concluded that selection of maize for increased frost resistance is a possibility. Distinction should be drawn between maize-crop survival which is ensured under cold by endosperm reserves and that resulting from frost tolerance. For example, in severe conditions (—7°C.) the overground parts of the plants perish, but if the seed is placed sufficiently deep (not less than 5 – 6 cm.) and if only the first 2 or 3 leaves freeze, growth of the succeeding leaves may be renewed because they are protected from freezing by an adequate soil layer. This odd capacity of maize to grow again is conditioned by the store of nutrients in the endosperm and is distinct from frost resistance.—M.H.

536 HARDY, G. W. **A nutrition study of corn and grain sorghum by means of foliar analyses.** *Diss. Abstr.* 1957, **17,** No. 7, 1438. [Kansas State Coll., Manhattan]

The studies reported were made: (a) to investigate the effect of soil applications of N, P, K, Ca and Mg on the content of these elements in the leaves of maize and grain sorghum [*Sorghum vulgare*], (b) to establish the lower critical levels of N and P in the leaves, and (c) to determine whether leaf analyses were of value for indicating soil deficiencies of N, P, K, Ca and Mg. Samples analysed were composites of the 3rd basal leaves. The critical lower limit of leaf-N content in sorghum was 2·7%; for maize, this value was less than 2·38%. No critical levels could be established for P. Maize yields were high where leaf-P contents were 0·26–0·29%; for sorghum, best yields were associated with P-concentrations of 0·33–0·48%. Leaf analyses were of value for indicating soil deficiencies of N and K. High foliar Mg contents were associated with low contents of K in the soil.—P.J.B.

537 FERNÁNDEZ, G. R. and LAIRD, R. J. Riegue el maíz espigando. [**Maize irrigation during earing.**] *Agricultura téc., Méx.* 1957, No. 4, 5 and 46–7, illus.

In a trial at the Experimental Field of La Cal Grande, Gto., Mexico, in 1955, the maize hybrid H-220, sown at the beginning of March, was subjected to 4 durations of drought during earing (0, 4, 8 and 11 days) and 4 levels of manuring (0, 50, 100 and 150 kg. of N/ha.). Regular irrigation was applied before earing. Results showed that in the plots not subjected to drought

the ear yields varied from 2·7 tons/ha. with no N to 6·2 tons with 150 kg. of N, while in the plots affected by 11 days of drought the corresponding yields were 2·5 and 4·7 tons. Eleven days of drought had, therefore, little effect on the maize grown at a low level of fertility, but reduced considerably the yield of maize manured with 150 kg. of N.—E.B.O.

538 Viégas, G. P. and Freire, E. S. Adubação do milho. 6. Ensaios sôbre modos de aplicação dos adubos. 7. Ensaios com torta de algodão. 8. Ensaios com estêrco e adubos minerais. 9. Ensaio com lôdo de fossas sépticas "OMS". 10. Ensaios com calcário. [**Manuring of maize. 6. Trials on methods of applying fertilizers. 7. Trials with cottonseed meal. 8. Trials with farmyard manure and chemical fertilizers. 9. Trials with dried sewage sludge. 10. Trials with limestone.**] *Bragantia* 1956, **15,** No. 1, 1–20, bibl. 3; No. 7, 65–82, bibl. 9; No. 11, 107–20, bibl. 4; No. 14, 137–51, bibl. 12; and No. 16, 169–76; English summaries. [Inst. Agron., São Paulo, Brazil]

539 Rost, C. O. and Kramer, H. W. **Soil management on the Webster soils of Southern Minnesota.** *Sta. Bull. 438 Univ. Minnesota Agric. Exp. Sta.* 1957, pp. 16.

Sweet clover sown among oats and grown as a green manure in a 2-yr. rotation of oats and maize increased yields of both crops. Yields of maize were increased more than yields of oats. Commercial fertilizers were more effective on land where green manure was ploughed in. NPK fertilizer gave the greatest increase in oat yields. Maize yields were increased most where a hill application of NPK was made in order to assist early growth. Oat and maize yields in a 4-yr. rotation of oats, hay, maize and maize were respectively 5 and 15 bu./ac. higher than yields in the 2-yr. rotation when no manure or fertilizer was applied ; these yields were similar to those obtained in the 2-yr. rotation when green manure was used. Farmyard manure applied to first-year maize in the 4-yr. rotation increased yields of first- and second-year maize, but had little effect on the oat and hay crops. The latter treatment, with hill application of fertilizer to second-year maize, increased maize yields substantially and showed some residual effect on the hay crop.—From authors' summary. R.B.

SORGHUM AND MILLETS

See also Abs. 536, 842

540 Benvenuti, A. Sulla coltivazione della saggina da scope in Italia. [**The growing of broom corn in Italy.**] *Agricoltura ital.* 1956, **56,** No. 12, 464–96, bibl. 32, illus. [Ist. Agron., Univ. Pisa, Italy]

The information given on broom corn [*Sorghum saccharatum*] and its cultivation in Italy includes : the morphological and biological characteristics of this plant, local (unimproved) varieties, cultural methods (climate, soils, manuring, sowing, harvesting, etc.). The average yield is 2000–2500 kg. of grain (used for animal feeding) and 1800–2300 kg. of broom per ha. The chemical analysis of the seed is given.—E.B.O.

541 Appathurai, R. **Influence of temperature and humidity on the growth of sorghums.** *Madras agric. J.* 1957, **44,** No. 7, 261–8, bibl. 7, illus. [Agric. Res. Sta., Kovilpatti]

The summer type, *Sorghum subglabrescens* and the main-season type *S. dochna* produce good crops when sown in mid-April and from July to September, respectively. *S. subglabrescens* also produces a good yield when sown in September/October but, on the other hand, *S. dochna* fails when sown in April. Neither type can survive sowing in January. —D.B.

542 Rachie, K. O. and others. Los mejores sorgos en 1956. [**The best sorghums in 1956 (in Mexico).**] *Agricultura téc., Méx.* 1957, No. 4, 18–20 and 42–3, illus.

543 Burkhardt, C. C. **Corn earworm control in grain sorghum.** *J. econ. Ent.* 1957, **50,** No. 5, 539–41, bibl. 3. [Kansas State Coll., Manhattan]

The best control of corn earworm (*Heliothis zea*) on grain sorghum, was obtained by the use of phosdrin at 0·375 and 0·5 lb./ac. in diesel oil, or as emulsions.—From author's summary. P.J.B.

544 Tarr, S. A. J. **Control of witchweed, *Striga hermonthica* Benth., in the Sudan Gezira.** *Nature, Lond.* 1957, **180,** No. 4595, 1143–4, bibl. 1. [Gezira Res. Farm, Wad Medani, Sudan]

While this root parasite on *Sorghum vulgare* can be controlled by spraying with certain hormone weed-killers, there is a need for simple methods of application because of the extreme sensitivity of some crops, notably cotton, to hormone herbicides. It is claimed that ridge application (as distinct from furrow treatment) from a watering can (sprinkler or jet) will reduce the cost of witchweed control and simplify the technique.—M.H.

545 Ryan, F. E. **Broom millet.** *J. Dep. Agric. W. Aust.* 1957, **6,** No. 5, 593–6, illus.

Recommendations are made for growing, harvesting and curing broom millet [*Sorghum vulgare*] for brooms, in Western Australia.—M.P.

546 Ratnaswamy, M. C. and Dhanaraj, Lily. **Improvement of Italian millet (*Setaria italica Beauv.*).** *Indian J. Agron.* 1957, **2,** No. 1, 5–11, illus. [Res. Inst., Coimbatore]

Two strains of *S. italica* produced by crossing

have the following desirable characteristics : heavy tillering (positively correlated with yield), retention of grain, and the plaited type of panicle. The grain yields of the progeny were 50–100% higher than those of the parents, which were themselves known in Coimbatore as high yielders.—D.B.

547 SREENIVASA IYENGAR, G. and GOPALA IYENGAR, K. **Kempu, an improved variety of Italian millet** — *Navane. Mysore agric. J.* 1957, **32**, No. 1, 54–6, illus. [Agric. Res. Sta., Mandya]

A description is given of Kempu, a new variety of *Setaria italica* which grows well on red soils in the early or the main season. Its grain yield is 25–40% above that of local varieties. The grain has a tendency to shed and must therefore be harvested early. Its dark grain does not command so high a price as white grain, but this is compensated for by higher yields. The tall, robust growth of the culms makes a coarse straw.—D.B.

548 NANDA, K. K. and others. **Some observations on lateral bud development in *Panicum miliaceum* and *Setaria italica*.** *Phyton* 1957, **8**, No. 2, 97–108, bibl. 56, Spanish summary. [Dep. Bot., Univ. Delhi, India]

Seeds of *Panicum miliaceum* var. p.v. 36 and *Setaria italica* var. Tenai Co. 1 were sown on different dates at 35-day intervals from 5 April to 19 July. Dry weights of the whole plants, as well as tillering and branching behaviour, were recorded. The vegetative period of the main shoot was progressively reduced with later sowings, and was accompanied by a progressive reduction in vegetative growth as measured by dry weight and tillering behaviour. The emergence of tillers, and of spikes on them, took place in acropetal succession. The development of lateral branches in *P. miliaceum* began only after ear emergence on the main shoot or tiller on which these were borne and took place in basipetal sequence. No lateral branches were produced in *S. italica*. The value of these findings is discussed.—From authors' abstract. E.B.O.

549 NANDA, K. K. and others. **Factors affecting growth and development of some millets. 1. Stem elongation and its correlation with flowering as influenced by the time of sowing.** *Phyton* 1957, **9**, No. 1, 15–24, bibl. 26, Spanish summary. [Dep. Bot., Univ. Delhi, India]

Seed of 6 species of millet, *Panicum miliaceum* var. p.v. 36, *P. miliare* var. Samai p.m. 2, *Setaria italica* var. Tenai Co. 1, *Echinochloa frumentacea* var. Kudiraivali p.c. 49, *Eleusine coracana* var. Ragi. Co. 1 and *Paspalum scrobiculatum* var. Varagu p.s. 1, were sown at 5 dates at 35-day interval from 5 Apr. to 24 Aug., 1952. In all the species there was a progressive shortening of the vegetative period with later sowings. It appeared that stem elongation was determined by the length of the vegetative period. By hastening the time of flowering by late sowing, stem elongation started earlier and was faster, and by delaying the onset of flowering by early sowing, stem elongation was retarded. The effect of the length of the vegetative period on stem growth was also observed where the stem elongations of 6 millets having different vegetative periods were compared among themselves. The highly significant positive correlation between the vegetative period and the period preceding the initiation of real stem growth also showed that stem growth is a direct resultant of the developmental process.—From authors' abstract. E.B.O.

RICE

550 SAMPIETRO, G. I diversi modi di coltivazione del riso in Cina. [**The different methods for growing rice in China.**] *Genet. agr.* 1957, **7**, No. 3–4, 193–213, illus. [Sta. Sper. Risicolt., Vercelli, Italy]

The author, who took part in an Italian agro-biological mission to China in 1956, gives information on rice cultivation in that country. China has the highest total rice production in the world, estimated at 75,800 million kg. in 1955, from 29 million ha. (its rice area is inferior only to that of India). The average yield is 2400 kg./ha., yields varying greatly from less than 1000 kg./ha. in mountain areas to more than 7000 kg./ha. in Tientsin (one crop per year from well manured fields). Practically all types of rice cultivation are present. In recent trials rice was grown successfully up to 50°N Lat. The main aspects considered are : the season of the year in which rice is grown and the number of rice crops per year (there are zones with 1, 2 or 3 crops per year) ; sowing and transplanting, the latter being the general practice ; use of water (non-irrigated cultivation, different types of irrigation, and cultivation on naturally-flooded land). It is concluded that rice cultivation in China lacks fertilizers, machines, selected seed and suitable crop rotations, but that advanced cultural methods are practised, i.e. perfect soil regulation ; careful sowing, transplanting and weeding ; harvesting and storage with minimal losses.—E.B.O.

551 GHARE, M. M. and BALKAVADE, K. K. **Waingan paddy ; promising hot weather crop.** *Farmer, Bombay* 1957, **8**, No. 9, 18–21, illus. [Agric. Res. Sta., Khopoli, Bombay]

During a 4-yr. trial at the above station, rice was grown satisfactorily in the hot season. The plants grew luxuriantly to a height of 3 ft., had an average of 16 tillers, were free from pests and diseases and, in spite of lodging during its later stages, yielded 31 Bengal maunds of grain per ac. [1 maund = 82 lb.]. This crop, sown at the end of December, constitutes a second crop of rice in one

year. Conditions for success include : ploughing the land in November immediately after harvesting the kharif crop ; heavy manuring with farmyard manure and $(NH_4)_2SO_4$; choice of an early-maturing variety such as Patni 6 or early Kolpi No. 70 ; and ample facilities for irrigation at 2–3 day intervals.—D.B.

552 Izumi, S. and others. **The influence of different irrigating methods on water temperature of paddy field and growth of rice plants in the area where cold water damage occurs frequently. The case of Chikasono village, Tochigi prefecture.** [Japanese] *J. Kanto-Tosan Agric. Exp. Sta.* 1957, No. 10, 20–4, illus., English summary.

553 Yamaguchi, H. and others. **Researches on the technical improvement of rice culture on ill-drained fields.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26,** No. 1, 3–7, illus., English summary. [Chiba Agric. Exp. Sta.]

554 Koshiray, M. A. and others. **A summary report on rice improvement in Egypt in 1955.** *Internat. Rice Comm. News Lett.* 1956, No. 20, 16–22. [Pl. Breed. Sect., Minist. Agric., Egypt]

555 Piacco, R. Dal Lady Wright alla Stirpe 82 Chiappelli. [**From Lady Wright to Stirpe 82 Chiappelli.**] *Riso* 1957, **6,** No. 8, 8–10, illus. [Sta. Sper. Risicolt., Vercelli, Italy]

Stirpe 82 Chiappelli is a medium-early, high-quality rice variety, very resistant to lodging and disease. It is recommended for cultivation in all the Italian rice regions.—E.B.O.

556 Portères, R. Les variétés de riz de l'Ile du Kabak (Guinée Française). [**The rice varieties of Kabak Island (French Guinea).**] *J. Agric. trop. et Bot. appl.* 1957, **4,** No. 5–6, 185–211, illus.

Rice is the only field crop on Kabak Island where it is grown on 3000 ha. in continuous cultivation by primitive methods. During the dry season there is a considerable deposit of salts in the soil because of evaporation from saline underground water. Because rice is transplanted from nurseries near soft water, contact with these salts, which are washed away by the first rains, is avoided. Information is given on the history of rice-growing in Kabak and on each of the agricultural varieties grown, which are classified. These varieties are also shown in a list of botanical varieties and forms of *Oryza sativa.*—E.B.O.

557 Tepora, J. N. and Umali, D. L. **FB-24, a " runner " type variety of rice.** *Philipp. Agriculturist* 1957, **41,** No. 3, 191–2, illus.

A brief note is given on FB-24, a lowland variety. Where plants of this variety were harvested so as to remove the panicle above the topmost node, shooting from the nodes occurred 6 days after harvest. Where these nodes came into contact with the soil they rooted and gave rise to independent plants. Three to six shoots were produced by each stem. Shoots produced from nodes that had not rooted grew more uniformly than those from nodes that had rooted, or from basal tillers produced after harvest. The grain yield per ac. was slightly higher from nodal shoots than from basal tillers.—P.J.B.

558 Pawar, M. S. and Rajagopalan, K. **Rice varieties of Nizambad.** *Rice News Tell.* 1956, **4,** Nos. 3 and 4, 10–12. [Received Aug. 1957] [Dep. Agric., Hyderabad]

The more important rice varieties are described. The late varieties are Akkulu, Kichidi Samba, Krishna Katukalu, Neerugummadi, and the early varieties Rajagarkat, Sambonal, Rakergoudalu, Beetvadlu, Goudbeetlu, Teksannal, Pachaganer and Kaladhan.—D.B.

559 Pillai, M. R. and others. **Paddy strains for the East Coast districts.** *Madras agric. J.* 1957, **44,** No. 7, 289–95. [Central Sugarcane Res. Sta., Palur]

Strains suitable for each of the 4 seasons in which paddy is cultivated in the E. Coast districts of Madras are recommended on the basis of 4-yr. yield trials, the results of which have been statistically analysed.—D.B.

560 Takahashi, N. **Studies on the varietal difference in the velocity of germination of rice seeds.** *Rep. Inst. agric. Res. Tôhoku Univ.* 1956, **7,** No. 1, 1–15, bibl. 11, illus.

561 Nagato, K. and Kobayashi, Y. **Studies on the occurrence of notched-belly kernels (dogire-mai) in rice plants.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26,** No. 1, 13–14, illus. [Nagoya Univ.]

The notching of rice kernels was produced artificially by placing rice plants in the dark for 3 days during the 5–20 days after heading, thus checking the supply of nutrients to the grain. In such plants the dorsiventral growth of the starch cells in the middle of the kernel almost ceased, while in other parts of the kernel starch cells continued to grow normally. The earlier the translocation of nutrients was interrupted after heading, the deeper was the notching.—From English summary. D.B.

562 Sierra, Juliana N. **Effects of herbicides on weed species in lowland and upland rice fields.** *Philipp. Agriculturist* 1957, **41,** No. 3, 171–90, bibl. 15. [Cent. Exp. Sta., Laguna]

Studies were made on the germination and growth of a number of weed species and on the effect of pre- and post-emergence herbicidal treatments made to weeds in crops of upland and swamp rice. Herbicides used included : 2,4-D

amine and ester, 2,4,5-T, 2,4,5-TP, monuron, MCPA, amine salt of dinoseb, dalapon and amino triazole. *Echinochloa colonum*, though suffering temporary injury, was relatively resistant to all herbicides used. Seedlings of *Cyperus difformis*, *C. iria*, *Fimbristylis miliacea*, *Scirpus supinus* and *Celosia argentea* were killed, though older plants were resistant. The use of pre-emergence treatments in swamp rice resulted in increases in weed stands. Under conditions of intermittent flooding, increasing the depth of water from 2 in. to 6 in. resulted in improved weed control by post-emergence treatments. Continuous flooding, combined with post-emergence herbicidal treatment, gave the best control of weeds. Herbicidal injury to rice was noted in all cases, but was most serious with seedling rice. Control of broad-leaved weeds was good in both upland and swamp rice.—P.J.B.

563 Vasconcellos, J. C. Algas macroscópicas dos arrozais portugueses. [**Macroscopic algae of Portuguese rice-fields.**] *Publ. Minist. Econ. Com. reg. Comércio Arroz, Lisboa* 1956, pp. 76, bibl. 83, illus., English summary.

The first part of this work is concerned with the possible advantages to be derived from the presence of algae in rice-fields in view of the fixation of atmospheric N by the Cyanophyceae ; with the damage caused by algae ; and with their control. The various systematic groups are briefly described in the main part. [See also *Fld Crop Abstr.* 9 : 81.]—E.B.O.

564 Kodama, Y. and others. **Structure of farm management in the area where cold water damage of rice plant occurs frequently. The case of Chikasono village, Tochigi prefecture.** [Japanese] *J. Kanto-Tosan Agric. Exp. Sta.* 1957, No. 10, 1–19, illus., English summary.

565 Majumdar, G. P. and Saha, B. **Nodal anatomy and the vascular system of the shoot of rice plant (*Orysa sativa* L.).** *Proc. nat. Inst. Sci. India* (*B.*) 1956, **22**, No. 5, 236–45, bibl. 12, illus.

By means of serial transverse sections, a detailed study was made of the course of the vascular system through nodes and internodes of *O. sativa*. The bundles of the inner ring of vascular tissue are the leaf traces. They are formed from the prevascular meristem at the node, pass upward through 2 consecutive internodes and move out to their leaves at the next node but one. In the intervening node their shape changes from oval to elliptical.—D.B.

566 Misra, G. and Sahu, G. **After-effects of treatment of grains of an early rice with plant growth substances.** *Curr. Sci.* 1957, **26**, No. 8, 258, bibl. 9. [Ravenshaw Coll., Cuttack, 3, Orissa, India]

Seeds of an early-maturing variety of rice were treated with 100, 250 and 500 ppm. of β-indolacetic acid (IAA), α-naphthylacetic acid (NAA) and 2, 3, 5-triiodobenzoic acid (TIBA), and the effects on growth and development were observed. There was a delay of 4–7 days in ear emergence under IAA treatment, especially at 500 ppm. IAA and TIBA produced significant increases in tiller and leaf formation ; NAA brought about significant reductions in tillers, leaves and plant height. These variations in vegetative growth caused by the different treatments were conspicuous in the young stages and gradually disappeared with the age of the plant. Differences in grain yield as a result of treatments were not significant. The only significant increases in those plant attributes which contribute to yield were : number of panicles, with IAA at 500 ppm.; length of panicle and number of spikelets per panicle, with NAA at 500 ppm.—D.B.

567 Sato, K. **Studies on the starch contained in the tissues of rice plant. 4. Starch content in the culm related to lodging (Preliminary report).** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 1, 19, illus. [Tôhoku Univ.]

The culm of the rice plant is susceptible to lodging about 3 weeks after heading, at which stage the parenchymatous cells of the culm have been depleted of starch grains. Varieties resistant to lodging have abundant foliage, a high starch content in the culm and are late in maturing.—From English summary. D.B.

568 Murayama, N. **Studies on nitrogen metabolism of the rice plant in relationship to its growth.** *Soil Pl. Fd* 1957, **2**, No. 3, 134–41, bibl. 13, illus. [Nat. Inst. Agric. Sci., Tokyo, Japan]

The N content of leaf blade, leaf sheath, culm and ear and N translocation within the plant were investigated.—D.B.

569 Kumura, A **Studies on the production and behaviour of carbohydrates in rice plant. 5. Influence of nitrogen on ripening.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **25**, No. 4, 214–18, illus., English summary. [Fac. Agric., Tokyo Univ.]

N [amount not stated] given 1 week before and 5 days after heading, increased grain yield. Under a deficiency of N, the later-ripening processes suffered, because of decreased photosynthesis. Ripening also suffered under excess N, because of poor translocation of the products of photosynthesis to the panicle. Between 5 and 35 days after heading, 1·0 – 1·4% is the lowest level of N which should be maintained in the leaf blade for the ripening process.—From English summary. D.B.

570 Matsushima, S. and Manaka T. **Analysis**

of developmental factors determining yield and yield prediction in lowland rice. 39. On the mechanism of ripening. 5. Effects of temperatures and light intensities and their compound conditions in different stages in growth upon the ripening of rice plants. [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **25,** No. 4, 203–6, illus., English summary.

571 Matsushima, S. and Tsunoda, K. **Analysis of developmental factors determining yield and yield prediction in lowland rice. 40. On the mechanism of ripening. 6. Effects of the range of daily temperature in different stages in growth upon the ripening of rice plants.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **25,** No. 4, 203–6, illus., English summary. [Nat. Inst. Agric. Sci.]

572 Sircar, S. M. and Datta, S. C. **Studies on the physiology of rice. 10. Effects of potassium deficiency on growth and nitrogen metabolism.** *Indian J. agric. Sci.* 1957, **27,** No. 1, 1–23, bibl. 28, illus.

Rice plants, in a sand-culture experiment, suffered more from K-deficiency when N was supplied as NH_4NO_3 than as $NaNO_3$. K-deficiency caused an increase in the water content of the leaves and a reduction of proteins in the plant. K-deficient plants died prematurely from ammonia poisoning.—D.B.

573 Okamoto, Y. **Physiological studies of the effects of silicic acid upon rice plants. 3. Effects of silica supplied at various stages of the growth on rice plants.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **25,** No. 4, 219–21, illus., English summary. [Yamanashi Univ.]

The results demonstrated that Si is an essential element for normal rice growth.—From English summary. D.B.

574 Ueda, H. **Effects of iron on the growth of lowland-rice (*Oryza sativa*).** *J. Fac. Agric. Tottori Univ.* 1956, **2,** No. 3, 117–42, bibl. 23, illus.

Iron, as ferric hydroxide, improved the growth of rice seedlings. The better growth was a result of greater respiratory activity, probably arising from an increase of cytochrome oxidase.—D.B.

575 Iwaki, S. **Studies on the salt injury in rice plant.** [Japanese] *Mem. Ehime Univ. 6,* 1956, **2,** No. 1, 1–156, bibl. 228, illus., English summary.

Using the sand-culture method, the salt injury was studied when different concentrations of salt solution were applied at germination, the seedling stage, and after transplanting. 1·0% salt solution retarded germination, which ceased with a 2·5–3·0% concentration. At the seedling stage, 0·1% caused no observable injury, 0·3% caused injury 30 days after sowing, a 0·5% solution delayed leaf formation, stopped growth and killed the plant within 30 days. After transplanting, growth became slower with increasing salinity, until, at a concentration of 0·5%, the plant was killed. 0·5% appears to be the lethal concentration for seedlings. Injuries, caused by various concentrations of salt solution, in the root, tiller, leaf and culm, ears and flowers, are described. The spikelet suffered the greatest injury.—From English summary. D.B.

576 Digar, S. and Gupta, S. P. **Effect of different times of application of ammonium nitrate on Aman paddy on Gangetic alluvial soil.** *Indian J. agric. Sci.* 1957, **27,** No. 1, 79–89, bibl. 9.

The yield of grain and straw increased significantly with up to 40 lb. N as NH_4NO_3 per ac. A better result was obtained when the full amount was applied at puddling than at 4 weeks after transplanting. The straw/grain ratio was independent of manurial treatment.—From authors' summary. D.B.

577 Shiroshita, T. and others. **Investigation on the nutrient absorption of rice plants in the paddy fields irrigated with cold water. The case of Chikasono village, Tochigi prefecture.** [Japanese] *J. Kanto-Tosan Agric. Exp. Sta.* 1957, No. 10, 25–35, English summary.

578† Fukui, J. and others. **Studies on the adaptability of green manure and forage crops for paddy field condition. 5. The relationship between each crop and their suitable sowing time and length of sowing period.** [Japanese] *J. Kanto-Tosan Agric. Exp. Sta.* 1957, No. 10, 62–8, bibl. 4, illus., English summary.

The 3 sowing dates were 1 and 22 Oct. and 9 Nov. Crimson clover [*Trifolium incarnatum*], Chinese milk vetch [*Astragalus* sp.], alsike clover [*T. hybridum*] and red clover [*T. pratense*] gave the highest yields after early sowing. Of these, crimson clover was the only one which was not killed by frost after late sowing. Egyptian clover survived best when sown on 22 Oct. ; if sown early or late it was killed by freezing. Horse bean [*Vicia faba*] was tolerant of sowing date but gave its highest yield in early spring if sown early. Field pea and common vetch [*V. sativa*] were suited to late sowing. Hairy vetch [*V. villosa*], oat and Italian ryegrass [*Lolium multiflorum*] had a wide range of sowing dates without suffering damage from freezing. —From English summary. D.B.

579 Desai, A. D. and Seshagiri Rao, T. **Injurious effect of green manure on rice under ill-drained conditions.** *J. Indian Soc. Soil Sci.* 1957, **5,** No. 3, 147–53, bibl. 7, illus. [Main

Exp. Sta., Rajendranagar, Hyderabad]

Green manure applied to ill-drained and water-logged soils depresses the yield of rice very appreciably. Opening shallow drains (1 ft. wide and 9 in. deep) helps to overcome this trouble.—Authors' summary. D.B.

580 Okuda, A. and others. **Nitrogen-fixing micro-organisms in paddy soils. Distribution of non-sulphur purple bacteria in paddy soils.** *Soil Pl. Fd* 1957, **2**, No. 3, 131–3, bibl. 5, illus. [Kyoto Univ., Japan]

These photosynthetic bacteria, members of the Athiorhodaceae, occurred frequently in paddy soils but not in ordinary farm soils. They appeared to be N-fixing bacteria.—D.B.

581 Karunaratne, C. R. **A combined automatic seed drill, fertilizer distributor and weeder for mudland paddy.** *Trop. Agriculturist* 1957, **113**, No. 1, 87–96, illus. [Dep. Agric., Ceylon]

582 Houston, D. F. and others. **Changes in rough rice of different moisture content during storage at controlled temperatures.** *Cereal Chem.* 1957, **34**, No. 6, 444–56, bibl. 25, illus. [W. Utilization Res. and Devel. Div., U.S. Dep. Agric., Albany, California]

Samples of Caloro rough rice of 11·2, 13·8, 15·3, and 16·5% moisture content were stored in loosely covered tins, containing humidifying solutions, for 7 months at 21°C. and 32°C. The samples were tested monthly for moisture, odour, viability, milling yield, free acidity, monocarbonyl compounds, total sugars and reducing sugars. Changes in these characteristics occurred more quickly and more extensively as moisture content or temperature increased. Milling yields remained constant until quality had seriously deteriorated. Only the 2 low-moisture rices at 21°C. remained free from sourness. Counts of fungi and bacteria were also made. Populations of actinomycetes, bacteria and yeasts decreased under all storage conditions. Moulds increased in the 2 high-moisture rices, extensively at 16·5% moisture at both temperatures. The content of non-reducing sugars declined during storage, and the content of reducing sugars and free acids increased. The 3 most sensitive characteristics were percentage germination, content of non-reducing sugars, and log. of free acidity ; they showed a high degree of linear correlation.—From authors' summary. R.B.

583 Green, V. E. **The culture of rice on organic soils — a world survey.** *Agron. J.* 1957, **49**, No. 9, 468–72, bibl. 69. [Everglades Agric. Exp. Sta., Belle Glade, Florida]

Aspects reviewed include : geographical locations and characteristics of organic soils, and problems in the culture of rice on organic soils. The causes and prevention of hampa and akiochi conditions in rice grown on organic soils are discussed in some detail.—P.J.B.

584 Central Rice Research Institute, Cuttack. **Annual Report for 1954-55.** New Delhi, 1956, pp. 48. [Received May, 1957]

1. Efficiency of N-fertilizers for rice, pp. 3–4. Of 8 fertilizers tested at 20 and 40 lb. N/ac. ammonium chloride, ammonium phosphate and ammonium sulphate gave the highest increases in rice yields, at both rates of application.

2. Placement and split application of ammonium sulphate, pp. 4–5. Sub-surface applications, in which 20 lb. N/ac. were applied at sowing, 10 lb. 1 month later and 10 lb. just prior to flowering, resulted in the best rice yields.

3. Crop-sequence trial, pp. 7–8. Groundnut, cotton and gram appeared suitable preceding crops for rice. Double-cropping with rice was best if it followed green-manuring with mung.

4. Three crops of rice a year (p. 8) gave a total yield of 9298 lb. of paddy/ac. and 13,577 lb. of straw/ac. The crop sequence was : (1) a short-duration variety (Ch.45) grown from mid-April to end-June; (2) a medium-duration variety (T.141) grown from July–December ; (3) a short-duration variety (Ptb.10) from mid-January to early April.

5. Herbicides for weed control in rice fields, pp. 8–9. Phenoxylene 30 (MCPA) at 2 lb./ac. was superior to hand-weeding, intercultivation and the other herbicides with regard to rice-yields.

6. Control of rice pests, pp. 30–3. Folidol-E605 E.C. gave good control of gall fly (*Pachydiplosis oryzae*) and stemborers (*Schoenobius incertulas*) when the rice seeds were soaked in 0·1% folidol for 24 hr., followed by 2 irrigations of the nurseries with the insecticide. The insecticide was subsequently either sprayed on the transplanted crop 9 times at 10-day intervals until flowering or applied 5 times when the crop was irrigated every tenth day. Folidol was also of value for the control of rice caseworm (*Nymphula depunctalis*), the root aphid *Tetraneura hirsuta* and other pests. No toxic residues were detected on either the grain or straw after treatment.—M.P.

GENERAL

585 Ministry of Agriculture, Fisheries and Food. England and Wales. **Dredge and other mixed corn.** *Adv. Leafl. 457 Minist. Agric. Fish. Fd, Eng. and Wales* 1957, pp. 6.

The advantages and disadvantages of growing mixed crops of cereals or cereals + legumes in Gt Britain are outlined. Notes are given on 3 compatible mixtures : (1) oat and barley dredge ; (2) mashlum (spring-sown oats + beans) ; (3) winter-beans and cereals.—M.P.

586 Edwards, R. S. **Studies of the growth of cereals on seed-beds prepared by dry-**

sieving of the soil. 2. Post-emergence survival and development. *Emp. J. exp. Agric.* 1957, **25**, No. 100, 304–20, bibl. 13, illus. [Dep. Agric., Univ. Coll. Wales, Aberystwyth]

The winter survival of S172 winter oats, sown at 3 different dates in autumn on seed-beds made up of various sieved-soil separates at 2 degrees of consolidation, was studied. Attention is drawn to the importance of frost-heaving as a factor influencing winter survival of the plants. In these experiments, late-sowing (Nov.) and fine seed-beds were associated with high plant mortality through frost-heaving. Evidence suggested that, for plants from late-autumn sowings, survival under conditions of severe frost-heaving was higher on plots which had been consolidated at sowing time. The survival of spring-sown Spratt Archer barley plants which had emerged was high. In only 1 year was there a significant difference in survival rate attributable to the soil treatment. In this case the finest seed-bed carried the greatest number of surviving plants. Tiller numbers per plant, which constituted an index of plant development and vigour, did not appear to respond to the treatments applied. Such differences as did emerge favoured fine seed-beds.—From author's summary. M.P.

587 Istituto di Allevamento Vegetale per la Cerealicoltura, Bologna. Attività sperimentale 1947–1956. Nota riassuntiva. [**Experimental work in 1947-56. Summary note.**] Bologna, 1957, pp. 30, bibl. 20.

Wheat, pp. 2–6. In 1956 the varieties Funo, Fortunato and Fiorello were grown on about 400,000 ha., 50,000 ha. and 40,000 ha., respectively. New varieties now distributed are Funone, Funotto and Falchetto (the last is suitable for central and southern Italy.) Oats, barley and rye, pp. 7–8. The following varieties are grown : oats, Astra, Angelica and Ava (Ava is high-yielding and resistant to lodging) ; barley, Orazio, Ottone and Orfeo ; and rye, Cinquecento. Rice, pp. 10–11. The variety Rizzotto is high-yielding and resistant to lodging.—E.B.O.

588 Yamasaki, M. **On the identification of plant characters by testing the resistance of seeds to the toxic action of potassium chlorate.** *Proc. internat. Seed Test. Ass.* 1957, **22**, No. 1, 175–9, bibl. 10. [Agric. Fac., Univ. Tokyo, Japan]

Seed of winter- and spring-wheat and upland- and swamp-rice varieties was soaked in 3 or 4% concentrations of $KClO_3$, before being germinated. In a second series of trials, seedlings of wheat, barley and rice varieties had their roots immersed for 18–20 hr. in 0·8 or 1% concentrations of $KClO_3$. In both series of trials, subsequent injury to the plants after soaking treatment was negligible in spring wheats, but very severe in winter wheats. With rice varieties, in both series of trials, injury was severe in swamp varieties, but negligible in upland varieties. With barley in the second series of trials, injury was slight in spring varieties and slight to severe in winter varieties.—P.J.B.

589 Aufhammer, G. and Simon, U. Die Samen landwirtschaftlicher Kulturpflanzen im Grundstein des ehemaligen Nürnberger Stadttheaters und ihre Keimfähigkeit. [**The seeds of agricultural crop plants in the foundation stone of the former Nuremberg city theatre and their viability.**] *Z. Acker- u. PflBau* 1957, **103**, No. 4, 454–72, bibl. 27, illus. [Inst. Acker- u. PflBau, Techn. Hochsch. München, Weihenstephan, Bavaria]

Sealed glass tubes containing seeds of agricultural plants, together with a statement, dated April 1832, of harvest date (1831) and contents, were found in the foundation stone of the former Nuremberg city theatre and examined in the above Institute in 1955. The seeds were examined morphologically and chemically and subjected to germination tests. The contents of 6 of the tubes were identified as (1) chiefly *Triticum spelta* together with *T. aestivum* and *T. monococcum* ; (2) *Hordeum vulgare* convar. *distichon* ; (3) *Avena fatua* ssp. *sativa* vars. *mutica* and *aristata* ; (4) *Secale cereale*; (5) *Panicum miliaceum* and (6) *Lens culinaris*. The average protein content of 9–11% was normal but the moisture content of 7–8% was surprisingly low. From the germination tests, in which only oats and barley germinated, it is concluded that the longevity of husked cereals is greater than that of unhusked (wheat and rye). 13 of the 23 germinated barley seedlings and all the 8 germinated oat seedlings developed to maturity, though slowly. This spell of 124–5 years is the longest period for the longevity of cereals known to the authors. The findings throw light on the crops of that period in the agricultural areas around Nuremberg and on the weeds which were prevalent in those crops at that time.—D.B.

590 Ashiotis, A. **Weed control pays.** *Countryman, Nicosia* 1957, September, 12–13.

A list is given of the most common weed species found in cereal crops in Cyprus, with an indication of their susceptibility, or resistance, to 2,4-D.—E.B.O.

591 North Central Weed Control Conference. **13th Annual Research Report 1956** [n.d.], pp. 189. [Received April, 1957]

Abstracts presented included :

1. Effect of 2,4-D in two carriers on irrigated Concho wheat. By A. F. Wiese and H. E. Rea, p. 83. Autumn applications of 2,4-D ester at 0·5–2 lb./ac. reduced tillering and delayed the maturity of the wheat ; the 2 lb./ac. rate reduced yields significantly more when applied in 40 gal. of water/ac. than when applied with 35 gal. of

water + 5 gal. diesel oil/ac. Spring applications of 2,4-D were non-injurious.

2. Effects of 2,4-D, MCP and 4-(2,4-DB) on Andrew oats. By R. G. Robinson and others, pp. 81–2. Amine salts of these compounds, at 0·5–0·75 lb./ac. in 20 gal. of solution/ac., applied to oats just after the boot stage, all gave 100% control of *Chenopodium album* without reducing crop yields. MCPA, however, decreased the bushel weights and increased the hull percentage of the florets.

3. Maize [19 abstracts]. Pp. 31–2. 80–90% kill of horse nettle (*Solanum carolinense*) was given by 2,4,5-T (3 lb.), 2,4,5-T (2 lb.) + monuron (2 lb.), amino triazole (6 lb.) and 2,3,6-TBA (6 lb./ac.) ; no reduction in maize yields resulted. Pp. 37–8 and 43–4. Best control of *Agropyron repens* and highest maize yields resulted from pre-sowing application of MH (4 lb./ac.) when the weed was 8 in. high. Several chlorinated benzoic-acid derivatives were nearly as effective. Discing and ploughing decreased the effectiveness of dalapon and 2,3,6-TBA in controlling *A. repens* but reduced the toxicity to maize of the herbicides when applied before sowing at high rates. Pp. 86–96. Pre-emergence applications of CDAA (4 lb./ac.) and simazin (2–4 lb./ac.) gave good control of annual grass weeds, and caused no appreciable injury to the maize. The use of a number of other herbicides is also reported ; results were less consistent.

4. A comparison of new herbicides with standard treatments on sweet corn. By S. K. Ries, pp. 148–9. Excellent weed control without crop injury was given by application, when the crop was in the spike stage, of simazin (4 lb.), X 33 (2 lb.), X 80 (2 lb.) and CDAA (4 lb.) + 2,4–D amine (1 lb./ac.)

5. Sorghum [3 abstracts]. Pp. 84–5. Good control of *Amaranthus retroflexus* and *Setaria* sp. in a sorghum crop was obtained by early-June pre-emergence spraying with 6 lb. CDAA/ac. and karmex D.L. at 1·125 lb./ac. + 0·5 lb. 2,4-D ester/ac. ; the sorghum was uninjured. In studies with irrigated sorghum, yield reductions occurred when 2 lb. 2,4-D (amine)/ac. were applied at the 3-in., 6-in., and 23-in. stages and by 1–2 lb./ac. at the flowering stage. A number of herbicides applied at the 8-in. stage delayed maturity.—M.P.

592 Hay, J. R. [Summarizer]. [**Weed control in**] **Cereal crops.** [8 abstracts] *Res. Rep. Nat. Weed Cttee, E. Sect.* [*Canada*] 1957, 8–13.

1. Sow thistle [*Sonchus* sp.] control in cereals. Applications of 8–10 oz. MCPA a.e. of amine salt/ac. suppressed head formation in *Sonchus* sp., without injuring undersown legumes. Treatment with 8–12 oz. 2,4-D a.e. of amine salt/ac. eradicated *Sonchus* sp., but severely damaged undersown legumes.

2. Effect of several formulations of some phenoxy herbicides on the yield of the above-ground portions of 5 field crops and weeds. Wheat, barley, oats and peas, undersown with clover, were treated with 2,4-D amine, 2,4-DB Na salt and ester, MCPA amine Na and K salts and MCPB Na salt, and two propionic acid homologue formulations of MCPA. The herbicides were applied at 8 gal. spray volume/ac. Control of weeds was generally poor, owing to their maturity. *Polygonum persicaria* was injured by 2,4-D, only. *Spergula arvensis* and *Galeopsis tetrahit* were controlled by MCPA and the propionic formulations of MCPA, but not by 2,4-D.

3. Effect of butyric herbicides on certain weeds in oats. Oats were treated on 29 June, 25 days after being undersown with a clover/grass mixture, with the following : MCPA amine salt, MCPB Na salt and ester, 2,4-D amine salt and 2,4-DB Na salt. MCPB ester at 16 oz. a.e./ac. gave complete control of *Galeopsis tetrahit* and good control of *Polygonum persicaria* and *Chenopodium album*. 2,4-D amine at 8 oz. a.e./ac. damaged undersown clover.

4. Woundwort (*Stachys palustris*) control in cereals. Applications of 2,4-D ester and MCPA amine salt at rates of 8 and 12 oz. a.e./ac. were made to cereal crops heavily infested with woundwort. Best control of top growth of woundwort followed treatment with 12 oz. MCPA amine salt/ac. ; the roots of woundwort were not seriously injured.

5. The effect of 2,4-D and MCPA on oat varieties. The oat varieties Garry, Beaver, Rodney and Simcoe all showed a similar response to 2,4-D and MCPA esters when applied at the 4-leaf stage. [See also *Fld Crop Abstr.* 10 : 883.]—P.J.B.

593 Esau, K. **Anatomic effects of barley yellow dwarf virus and maleic hydrazide on certain Gramineae.** *Hilgardia* 1957, **27,** No. 1, 15–69, bibl. 49, illus.

594 Pennacchiotti, M. Irma and others. Valoración fluorimétrica del contenido de tiamina en avena, cebada y maíz. [**Fluorimetric determination of thiamine content in oats, barley and maize.**] *Agric. téc., Santiago* 1955, **15,** No. 1, 31–4, bibl. 5, English summary. [Received Nov., 1957]

595 Derenne, P. Signification du test au chlorure de 2, 3, 5-triphényltétrazolium appliqué aux céréales en période de gel intense. Deductions sur la résistance varietale au froid. [**Significance of the 2, 3, 5-triphenyltetrazolium-chloride test applied to cereals in a period of intense frost. Deductions on varietal resistance to cold.**] *Bull. Inst. agron., Gembl.* 1957, **25,** No. 1–2, 95–7, bibl. 2.

[See *Fld Crop Abstr.* 8 : 123.] The viability of cereal seedlings, taken from the field during a frost period in the winter of 1955–6, was tested with tetrazolium. The frost-resistant varieties were

alive and became a deep red. Those susceptible to frost were dead and did not react. There was doubt about seedlings, generally of medium-susceptible varieties, which exhibited intermediate shades of colour. The varieties were tested later in the frost period when they were protected by a layer of snow. Both resistant and medium-susceptible varieties became well coloured showing that the latter had regained vitality. It is, therefore, concluded that, with plants tested during frost, a colour more or less weak but uniform over the whole area of the cut indicates a depressed biological activity but also a possibility of recovery if growing conditions soon improve. If, instead, the colour is localized in the centre of the cut the plant is between life and death.—E.B.O.

596 LUBATTI, O. F. and BLACKITH, R. E. **Fumigation of agricultural products. 15. Germination and growth of cereals fumigated with methyl bromide.** *J. Sci. Fd Agric.* 1957, **8**, No. 12, 691–7, bibl. 7, illus. [Imp. Coll. Fld Sta., Sunninghill, Berks]

Different varieties of maize, wheat, oats, barley and rye, each at moisture contents of *c.* 8, 11, 14 and 17%, were fumigated with one of 2 doses of MeBr. Germination of the seeds was assessed immediately after the treatment and again after 6 months' storage at 20°C. Barley was appreciably more resistant to fumigation than the other cereals. Rye was the most, and maize the least, resistant cereal in terms of survival after damp storage, but damp rye was severely affected by MeBr. There were important differences in the reaction of different varieties of a cereal.—From authors' summary. M.P.

597 JACQUEMART, R. Quelques conseils pratiques pour la conservation des grains. **[Some practical recommendations on grain storage.]** *Rev. Agric., Brux.* 1957, **10**, No. 9, 1129–31. [Minist. Agric., Belgium]

598 KANSAS AGRICULTURAL EXPERIMENT STATION. **Fort Hays Branch Experiment Station results.** *Circ. 345 Kansas Agric. Exp. Sta.*, 1956, pp. 24, illus. [Received July, 1957]

Bison, Kiowa, Pawnee and Comanche mid-season varieties of winter-wheat were best adapted to the Hays area. Wichita was the best early variety. The most suitable varieties of spring-barley were Beecher, Custer and Oris. Sorghum varieties with grain containing carotene were being developed. *Sorghum sudanense* and *S. vulgare* produced higher yields of hay than *Setaria italica* under Hays conditions. *Franseria tomentosa* could not be controlled with 2,4-D, except in concentrations likely to harm cereal crops. Application of over 2 lb. 2,4-D/ac. when the weed was in bud followed by a summer-fallow season and autumn-sown wheat reduced *Franseria* infestation by 70–80% if weeding was carried out in the wheat crop. Root development in grain sorghum was investigated during 1955. The crop was sown in soil which was wet to field capacity ; 16·4 in. of water were used, of which 5·34 in. came from rainfall and 11·9 in. from stored soil-moisture. Grain yield was 37·5 bu./ac. By 9 Sept. water was being drawn from a depth of 90 in. Appreciable water absorption was confined to a root zone of 2 – 3 ft. only at any one time, and all available water was drawn from a zone in 2 – 3 weeks. After the drought of 1956, sorghum crops did not recover quickly following substantial rainfall or when water was added.—R.B.

LEGUMES

COWPEAS

599 MARCANO, C. L. and LINARES, S. P. J. "Orinoco", nueva variedad de frijol blanco (*Vigna sinensis*). "Arauca", nueva variedad de frijol bayo (*V. sinensis*). "Caroní", nueva variedad de frijol rojo (*V. sinensis*). **[Orinoco, Arauca and Caroní, new cowpea (*V. sinensis*) varieties.]** *Agron. trop., Maracay* 1956, **6**, No. 2, 87–97, illus., English summary.

The origin, description and agronomic characteristics are given of 3 new cowpea varieties. Orinoco, semi-erect and white-seeded, matures 75 days after sowing. It is well adapted to mechanized harvesting. In 2 years' trials its average yield was 1055 kg. of seed per ha. Arauca, erect and reddish-brown-seeded, matures 80 days after sowing. It is well adapted to mechanized cultivation and harvesting. Its average yield was 1098 kg. of seed per ha. Caroní, erect and red-seeded, matures 75 days after sowing. It is adapted to mechanized cultivation and harvesting. Its average yield was 1012 kg. of seed per ha.—E.B.O.

SOYABEANS

See also Abs. 629

600 LU, Y. C. and TSAI, K. H. **A report of the experiments on the different times of planting of the prospective soybean varieties.** [Chinese] *J. Agric., For.* 1956, **5**, 16–38, bibl. 10, English summary. [Formosa, (Taiwan)] [Received Jan., 1958]

Sixty soyabean varieties of Chinese, Japanese and American origin were sown on 10 different dates in 1954–5. The yields of most varieties were directly proportional to the length of the growing periods. Varieties sown in Feb. yielded less than those sown in July, but had a higher 100-seed weight and a slightly higher dry-matter content, 35–54% compared with 27–48%. Most of the varieties fell into distinct groups as regards sowing-date ; a few were suitable for all-the-year-round sowing.—From English summary. M.P.

601 Soybean Digest. **Crest, a new early soybean variety.** *Soybean Dig.* 1957, **18,** No. 1, 17.

A brief note is given on Crest which is adapted to southern Manitoba. It matures 3–4 days earlier than Kabott and 4–7 days earlier than Flambeau and has a high oil content.—P.J.B.

602 Lu, Y. C. **Inter-cropping of soybean by the " muddy-in " method with second crop of paddy rice.** *J. Agric., For.* 1956, **5,** 39–55, bibl. 9, illus., English summary. [Formosa, (Taiwan)] [Received Jan., 1958]

Six varieties of soyabeans from Taiwan, Japan and the USA were sown. Hill-seedings resulted in a higher average plant-yield, whereas drilling gave a high yield per unit area. The varieties Wu-tou and Avoyelles gave high yields but their beans are small and have dark seed coats which render them unfit for processing. The variety Shih-shih gave a good yield, had large beans with a yellow seed-coat and was very promising for cultivation in Taiwan. A-o-bi-ku, Taiwan-ching-pe-tou and Fukien-ta-tou are also yellow-coated but have small beans and a thick seed-coat.—From English summary. M.P.

603 Miyasaka, S. and Silva, J. G. da. A inoculação de sementes de soja tratadas com arasan. [**The inoculation of soyabean seeds treated with arasan.**] *Bragantia* 1956, **15,** No. 23, 329–35, bibl. 14, English summary. [Inst. Agron., São Paulo, Brazil]

Field trials were carried out in 3 localities in Brazil to study the compatibility of seed treatment with arasan with inoculation with *Rhizobium japonicum* using the soyabean varieties Abura and Mogiana. Results showed that : (a) arasan treatment caused a slight increase in the percentage of germination ; (b) inoculation immediately before sowing increased significantly both the number of nodules and seed yield. It is concluded that under the conditions of these trials, arasan treatment does not impair the efficacy of inoculation.—E.B.O.

604 Neilson, J. J. [Summarizer] [**Weed control in**] **Soyabeans and field beans.** [4 abstracts] *Res. Rep. Nat. Weed Cttee, E. Sect.* [*Canada*] 1957, 25–7.

Of a number of herbicides applied 5 days after sowing soyabeans, dinoseb at 3 lb. active material/ac., combined with CDAA at 4 or 8 lb. active material/ac. gave good control of both grass and broad-leaved weeds.—P.J.B.

605 Blaney, L. T. and Hamner, K. C. **Interrelations among effects of temperature, photoperiod, and dark period on floral initiation of Biloxi soybean.** *Bot. Gaz.* 1957, **119,** No. 1, 10–24, bibl. 10, illus. [Oregon State Coll., Corvallis]

Experiments with the Biloxi soyabean [*Glycine soja*] showed that the length of photoperiod as well as the length of dark period influenced the degree of floral initiation. Maximum flowering occurred during cycles of light and darkness either 24 hr. long or 48–52 hr. long, demonstrating floral initiation in this variety to be influenced by an endogenous rhythm of 24 hr. duration. Cool temperatures during part of the cycle had a marked effect on the response of the plants, making the length of the rhythmic cycle other than 24 hours.—From authors' summary. R.B.

606 Fukui, J. and Ojima, M. **Influence of soil moisture content on the growth and yield of soybean. 5. Changes of carbohydrate and nitrogen in soybean plant as affected by deficient or excessive soil moisture contents at various growing periods.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26,** No. 1, 40–2, illus., English summary. [Kanto-Tosan Agric. Exp. Sta.]

607 Kamata, E. **Morphological and physiological studies on nodule formation in soybeans. 2. Relations between the foliar application of carbohydrates and nodule formation.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26,** No. 1, 58–60, illus., English summary. [Univ. Tokyo]

608 Thorogood, E. **Oxygenated ferroheme proteins from soybean nodules.** *Science* 1957, **126,** No. 3281, 1011–12, bibl. 2. [Bacteriol. Dep., Univ. Illinois, Urbana]

The isolation and properties of ferrohæme proteins from soyabean nodules, are described. —P.J.B.

609 Toriyama, K. and Toyokawa, R. **A study of the low-temperature injury in soybean.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **25,** No. 4, 197–8. [Aomori Agric. Exp. Sta., Fujisaka Farm]

Low-temperature treatment (17°C. and 20°C.) given at flowering resulted in very few flowers, the presence of cleistogamous flowers, an increase in the number of sterile seeds and one-seeded pods, and a reduction in seed weight.—From English summary. D.B.

610 Probst, A. H. and Everly, R. T. **Effect of foliage insecticides on growth, yield and chemical composition of soybeans.** *Agron. J.* 1957, **49,** No. 11, 577–81, bibl. 6. [Purdue Univ. Agric. Exp. Sta., Lafayette, Indiana]

In 1950, DDT in emulsifiable, colloidal, oil-soluble and wettable forms was applied at a rate of 2 lb./ac. to the Blackhawk variety of soyabean [*Glycine soja*] on 3 dates, both as single and as cumulative applications. In 1951, single sprayings of DDT at 3 rates of application, and one rate of application of aldrin, BHC, chlordane, dieldrin,

dilan, endrin, EPN, heptachlor, methoxychlor, schradan, demeton and TDE were used. Insect populations were at a low level. Spray injury to foliage was most severe with oil-soluble DDT in both single and cumulative applications, and with dilan and BHC for single applications. Seed quality was not affected by any of the treatments.—From authors' summary. R.B.

GROUNDNUTS

611 Robertson, W. R. Pratiques d'aménagement des sols en vue d'une amélioration de la production d'arachides en Floride. [**Methods of soil management for improving groundnut yields in Florida.**] *Oléagineux* 1957, **12**, No. 10, 607–13, bibl. 22, illus. [Agric. Exp. Sta., Gainesville, Fla]

612 Pelerents, C. L'arachide à Yangambi. [**The groundnut at Yangambi.**] *Bull. Inform. I.N.É.A.C.* 1957, **6**, No. 4, 243–55, bibl. in text, illus. [Yangambi Sta., Belgian Congo]

Observations indicated that thrips are the only pollinating agents. In 2 plots treated each week with parathion to destroy insects, the average percentage of natural hybrids was 0·2, or 10 times less than in untreated plots. The groundnut varieties now distributed are : A 20, A 92, E 4/2 and P 43. With erect varieties, the best spacing is : pockets with 2 seeds at 20-cm. intervals in the row and 40 cm. between rows. With this spacing, 80–100 kg. of seed are required per ha., according to variety. The sowing depth is generally 4–5 cm. The crops are weeded once or twice. On the sandy clay soils of the plateau, after a forage crop lasting 2 years, groundnut yields are about 1800–2000 kg. of nuts per ha.—E.B.O.

613 Rassel, A. La culture de l'arachide sur les plateux du Kwango. [**Groundnut cultivation on the Kwango plateaux (Belgian Congo).**] *Bull. Inform. I.N.É.A.C.* 1957, **6**, No. 5, 301–11, illus. [Sta. Exp. de Kiyaka]

The plateaux of the south Kwango, which have poor sandy soils, are generally unsuitable for groundnut cultivation which is confined to small pockets rich in humus, where yields of 300–800 kg. of shelled nuts per ha. are obtained. Preliminary results are given from investigations to improve groundnut cultivation in the pockets and to extend it to the rest of the plateaux. A 28, the best of the groundnut varieties tested, increases yields in the pockets by 20–50%. In the areas outside the pockets, the application of 500 kg. of lime per ha. at sowing gave reasonably good yields of groundnuts (500–700 kg. of shelled nuts per ha.). As A 28 is early, it can be grown in both the long and the short rainy season. Thus 2 crops per year can be obtained, lime being applied to the first only.—E.B.O.

614 De Preter, E. Les essais locaux d'arachides au sud du Congo belge (1942 à 1956). [**The local groundnut trials in the south of the Belgian Congo (1942-56).**] *Bull. agric. Congo belge* 1957, **48**, No. 5, 1103–22, illus. [Sta. Exp. de l'INÉAC, Gandajika]

In trials in the south of the Belgian Congo, the early groundnut variety A 65 (red kernel), in general use in the Belgian Congo, was inferior in yield and other characters to the following varieties which have a pink (white or brown) kernel : A 1064 (A 28) in Kwango, A 1052 (A 10) in Kasai, A 1052 in Katanga and Kivu, and A 1055 in the Ruzizi valley.—E.B.O.

615 Narasimha Rao, V. L. and Gideon, C. A. **Pre-soaking : a method to increase crop yields in groundnut.** *Indian Oilseeds J.* 1957, **1**, No. 4, 247–51, bibl. 20.

Seed treatment with IAA and NAA increased germination from 86 to 94%. They did not produce any favourable effect on the date of first flowering, the maturity period or the oil content in the groundnut varieties studied. Number of shoots per plant, fresh and dry matter produced, and yield of pods were improved by seed treatment with these auxins. Response to IAA was more pronounced than to NAA. IAA at 5 – 10 ppm. gave the best pod yield.—From authors' conclusions. D.B.

616 Harris, H. C. and Gilman, R. L. **The effect of boron on peanuts.** *Soil Sci.* 1957, **84**, No. 3, 233–242, bibl. 18, illus. [Florida Agric. Exp. Sta., Gainsville]

Greenhouse experiments were conducted on the effect of B on the yield and quality of groundnuts by (a) testing the Early Runner variety for oil- and mineral-content and quality, (b) comparing the yield with that of the Dixie Runner variety. Application of B markedly increased kernel yields of both varieties, and decreased foliage yields. Early Runner showed the largest yield response to B. The quality of both varieties was improved ; groundnuts without B had a high incidence of hollow-heart defect, which was practically eliminated by B application. A relatively low percentage of well-developed seeds resulted from absence of B. Mineral- and oil-content of Early Runner kernels was not affected by B treatment.—From author's summary. R.B.

617 Ollagnier, M. and Prevot, P. L'alimentation en soufre de l'arachide au Sénégal. [**Sulphur nutrition of groundnuts in Senegal.**] *Oléagineux* 1957, **12**, No. 8/9, 539–45, bibl. 8, illus.

At Darou, south Senegal, the application to groundnuts of 40 kg. of ammonium sulphate per ha. gave yield increases of 600–900 kg. of pods per ha., this effect being due entirely to the sulphur.—From authors' summary. E.B.O.

618 Reid, P. H. and York, E. T. **Soil fertility effects of intensive greenhouse cropping with peanuts.** *Agron. J.* 1957, **49,** No. 11, 589–92, bibl. 9. [N. Carolina State Coll. Exp. Sta., Raleigh]

619 OEEC. **The main products of the overseas territories : oilseeds.** *Publ. OEEC* 1957, pp. 333, illus.

This study is concerned with the production, consumption, marketing and prices of groundnuts and other oilseeds.—E.B.O.

PEAS

See also Abs. 629

620 Reynolds, J. D. **Some developments in threshed-pea growing [in Britain].** *Agric. Rev., London* 1958, **3,** No. 8, 22–26, bibl. 32. [Pea Gr. Res. Org. Ltd., Yaxley]

621† Paton, D. M. **Thermoperiodic and photoperiodic control of flower initiation in a late pea variety.** *Suppl. Pl. Physiol.* 1957, **32,** ix–x. [California Inst. Tech., Pasadena]

622 Turner, J. F. and others. **Physiology of pea fruits. 4. Changes in sugars in the developing seed.** *Aust. J. biol. Sci.* 1957, **10,** No. 4, 408–43, bibl. 21, illus. [Bot. School, Univ. Sydney]

623 Rowan, K. S. and Turner, Donella H. **Physiology of pea fruits. 5. Phosphate compounds in the developing seed.** *Aust. J. biol. Sci.* 1957, **10,** No. 4, 414–25, bibl. 30, illus. [Bot. School, Univ. Melbourne, (K.S.R.) ; Bot. School, Univ. Sydney, (D.H.T.)]

BEANS

624 Dickinson, D. and others. **Varieties of broad beans suitable for canning.** *Chem. and Industr.* 1957, No. 46, 1503, bibl. 3. [Fruit. Veg. Canning and Quick Freez. Res. Ass., Chipping Campden, Glos]

Triple White, a white-flowered variety of broad bean, has proved to be entirely satisfactory for canning because of its colour after processing. The variety Threefold White Longpod was slightly inferior to Triple White.—E.B.O.

625† Whittington, W. J. **The role of boron in plant growth. 1. The effect on general growth, seed production and cytological behaviour.** *J. exp. Bot.* 1957, **8,** No. 24, 353–67, bibl. 28, illus. [Sch. Agric., Univ. Nottingham]

The relation of boron to vegetative growth and seed production of *Trifolium pratense* and *Vicia faba* has been studied, using sand- and water-culture techniques. The addition of a very small quantity of B was sufficient to restore deficient plants to normal growth and apparently B-fertilizers are beneficial only where deficiency symptoms have been shown. The rapid cessation of cell division under B-deficiency was responsible for a decrease in both vegetative and seed yields through reduced branching and flower differentiation. No special association of B with the functioning of pollen or with chromosome behaviour was found. The cessation of cell division is responsible for the abnormalities associated with B deficiency but the cellular reactions involved remain unknown. Previous suggestions of the role of B in plant metabolism are discussed in the light of the conclusion that it is essential for the maintenance of meristems.—From author's summary. M.H.

PIGEON PEAS

626† Neme, N. A. Cultura do guandu. [**Pigeon pea cultivation.**] *Agronômico, Campinas* 1955 **7,** No. 11–12, 24–8. [Received June, 1957]

Information is given on the growing of pigeon pea [*Cajanus cajan*] for green manure in Brazil.—E.B.O.

LUPINS

627 Steveninck, R. F. M. van. **Factors affecting the abscission of reproductive organs in yellow lupins (*Lupinus luteus* L.). 1. The effect of different patterns of flower removal.** *J. exp. Bot.* 1957, **8,** No. 24, 373–81, bibl. 11, illus. [Dep. Sci. Ind. Res., Christchurch, N.Z.]

The effect of various patterns of flower removal on pod setting was investigated in *L. luteus*. Four-fifths, three-fifths, or two-fifths of the flowers of the main inflorescence were removed according to 10 different patterns. All flowers could produce pods but later ones were less efficient in doing so. Developing pods had an abscission-inducing effect on later flowers, which became increasingly effective towards the apical part of the inflorescence. More pods were retained when flowers on each consecutive whorl were arranged in a spiral than when the same number was arranged vertically. Pod setting was incomplete when the number of flowers per inflorescence was reduced well below the total number of pods normally present. The number of ovules in consecutive flowers gradually decreased from an average of 5·7 at the base to 4·3 at the top of the inflorescence. The ratio of seeds to ovules fluctuated irregularly between 65 and 94% and did not indicate a general trend in embryo abortion. The growth-rate of pods at the top of the inflorescence was much slower than at the bottom. Vascular differentiation was almost absent at the top of the inflorescence when the flowers were fertilized, and further vascular tissue was produced only when flowers produced pods.—Author's summary. M.H.

GENERAL

628† Garanina, L. **[Sowings of *Lathyrus* spp. as green manure under cotton and for stock-feed.]** [Russian] *Hlopkovodstvo* 1957, **7**, No. 10, 26–9, illus.

In the cotton regions of the USSR, winter peas were formerly grown for green manure, and, on certain collective farms, *Trifolium resupinatum* has been grown for this purpose. There is a need, however, for a crop which will give high yields of green matter for manure and for stock-feed during the autumn and early spring. Species of *Lathyrus* show promise in this respect as the plants are drought resistant and the period between their germination and flowering is comparatively short. A study of 460 samples from a world collection of *Lathyrus* was carried out during 1954–6 and it is concluded that, for green manure in the southern regions of the cotton area, the following annuals are of value : *L. sativus*, *L. tingitanus*, *L. cicera* and *L. ochrus*. The agronomical characteristics of these species are described and measures for growing them after harvest of the cotton crop and on newly-developed land are outlined. *Lathyrus* can be grown either alone or (for silage) in mixture with sorghum or maize.—M.H.

629 North Central Weed Control Conference. **13th Annual Research Report 1956.** [n.d.], pp. 189. [Received April, 1957]

Abstracts presented included :

1. Field and canning peas, [6 abstracts], pp. 132–7. Promising chemicals for the control of *Setaria* spp. and other annual weeds in peas included : pre-emergence, CDAA (4–6 lb./ac.), diuron (2 lb.), dinoseb (8–9 lb.) and monuron (2 lb.) ; post-emergence, dinoseb (1–1·5 lb./ac.), dalapon (0·5–1 lb.) + dinoseb (1·5 lb.), dalapon (1 lb.) + MCPB (amine, 0·5 lb.).

2. Soyabeans, [19 abstracts], pp. 102–7, 173–80. The use of a number of chemicals for weed control in soyabeans is discussed. CDAA, at various rates, gave good to excellent control of grass and medium to poor control of broad-leaved weeds. Studies to determine the relative effectiveness of various combinations of pre-emergence sprays, rotary hoeing and cultivation are reported. The value of timely rotary hoeing is stressed.—M.P.

630 Emery, G. A. **Bean fly.** *E. Afr. Fmr and Planter* 1957, **2**, No. 3, 37.

In seed-dressing trials, carried out in 1956, for the control of *Melanogromyza phaseoli*, a pest of beans, cowpeas and soyabeans, wet-dressings (at 0·9 g./lb. of seed) of aldrin, endrin and dieldrin protected the plants from attack for at least 30 days after germination ; aldrin and lindane, as dry treatments, were also effective. In all cases, slight phytotoxicity was observed. Where attack of a crop is suspected, dusting the cotyledons with 0·65% γBHC or 2% DDT, followed by 3 further applications at 4-day intervals is recommended. Alternatively the cotyledons can be sprayed with 0·1% DDT and again at 4-, 7- and 7-day intervals. —M.P.

ROOT CROPS

SUGAR-BEET

See also Abs. 869

631 Snyder, F. W. **Effect of moisture and fertilization on emergence of sugar beet seedlings.** *Sug. Beet J.* 1957, **9**, No. 5, 450–5, bibl. 1. [Fld Crops Res. Br., U.S.D.A., E. Lansing, Mich.]

For a given treatment, emergence was progressively delayed as the soil-moisture level decreased. Banding 100 lb./ac. of 10-10-10 (NPK) fertilizer in contact with seed in rows 28 in. apart at 14·7% soil moisture resulted in less than 50% emergence in 20 days. Emergence was substantially delayed when seeds were placed 0·5 in. above the band of fertilizer, as compared with seeds placed 0·5 in. above and 1 in. to the side of the band. At the same application rate, but in contact with the seeds, 0–20–10 delayed emergence least, 0–10–20 was intermediate, and 10–10–10 delayed emergence most. This was correlated with the solubility of the fertilizers.—From author's summary. R.B.

632 Maughan, G. L. and Chittey, E. T. **Down-the-row thinning of sugar beet : field experiments, 1952-54.** *J. agric. Engng Res.* 1957, **2**, No. 4, 271–84, bibl. 6, illus., French, German and Spanish summaries. [Nat. Inst. Agric. Engng, Silsoe, Beds]

Using 2 seed-rates, hand-singling was compared with 4 degrees of machine-thinning with and without hand-trimming. After the first year, only rubbed and graded seed was used as this gave a braird which was more suitable for mechanical thinning. Compared with hand-singling, the hand-trimming of machine-thinned beet showed economies of labour to the extent of 3–47% of the hand-work, but reduced the final plant population by 6–17% and this was accompanied by an average loss in yield of 8% (maximum 14%). Machine-thinning with subsequent hand-weeding produced no loss of yield and one experiment showed that the total spring-labour requirement could be reduced by up to 57%. However, it produced an irregular plant stand which made mechanical harvesting slightly more difficult.—From summary. M.P.

633 Jorritsma, J. De mechanisatie van de voorjaarswerkzaamheden in de bietenteelt. 2. Zaaidunproeven 1956. **[Mechanization of spring work in sugar-beet growing. 2. Drilling and thinning experiments, 1956.]** *Meded.*

Inst. rat. Suikerprod. 1957, **27**, 1–95, illus., English summary.

Four types of sugar-beet seed were tested for their efficacy in facilitating spring work, namely : normal seed ; graded, polished and sieved seed, called M seed ; pelleted seed ; and natural monogerm seed (from Denver, Colorado). In order to determine whether the use of a thinner could be replaced by a lower sowing rate, the normal and M seed were sown at different rates as follows (in kg./ha.) : normal, 18·5 and 12·3 ; M seed, 9·6 and 6·0. A Hudson weeder-thinner was used more or less intensively according to initial stand and variations of treatment included in the original plan. Its efficacy and its effect on the crop were checked by stand counts, time-records, records of crop development and weed growth, and finally by determination of yield and sugar content at harvest. Studies were also made of the influence of drag-irons, drag-coulters, a press-wheel seed-coulter system and a precision-drill unit on the emergence and distribution of normal, M, and natural monogerm seed. For the results obtained reference should be made to the detailed English summary.—G.M.R.

634 Cavanillas, R. L. and others. Experiencias sobre riego de remolacha azucarera y patatas, años 1947 a 1953. [**Irrigation trials with sugar-beet and potatoes in 1947-53.**] *An. Inst. nac. Invest. agron.* 1956, **5**, No. 4, 595–775, illus. [Campo de Riegos, El Encín, Spain]

The following are the principal conclusions drawn from the statistical analysis of irrigation trials with sugar-beet and potatoes grown in lysimeters : (a) the average value of the ratio of water (rainfall + irrigation) consumed to evapotranspiration (expressed as a percentage of the latter) is about 101 for sugar-beet and 105 for potatoes ; (b) with sugar-beet, there is a positive correlation between the N applied to the plant and the water consumed/evapotranspiration ratio ; (c) with both plants, there is a high positive correlation between water consumed and yield, in the lysimeters the most advantageous doses of water being 14,250–16,750 cu. m./ha. for sugar-beet and 4600–6000 cu. m./ha. for potatoes ; (d) there is a positive correlation between yield and water consumed/evapotranspiration ratio, this correlation being higher for potatoes than for sugar-beet ; (e) the average unit water consumptions are 485 kg. for potatoes and 300 kg. for sugar-beet ; (f) there is a negative correlation between yield and unit water consumption, this correlation being higher for sugar-beet than for potatoes.—E.B.O.

635 Stumpel, J. M. H. Enige gegevens over de suikerbietenteelt in Limburg in 1952. [**Information on sugar-beet-growing in Limburg in 1952.**] *Meded. Inst. rat. Suikerprod.* 1955 (1957), **25**, 101–78.

The conclusions drawn are based on replies to a questionnaire relating to some 2883 sugar-beet plots. The crop was grown mostly on sand rich in humus. Kuhn P and Kleinwanzleben E were the varieties principally grown, the former giving an average yield 5·3 tons/ha. lower than that of the second but having a sugar content 0·4% higher. Sowing dates varied from 25 Feb. to 1 June, and the earlier the sowing the higher was the percentage of plots with good yields. Potatoes proved to be the best preceding crop for sugar-beet. Manurial treatments varied enormously as shown by the range (in kg./ha.) in the amounts of the different fertilizers applied, namely, N, 0–300; K_2O, 0–400; P_2O_5, 0–200; and CaO, 0–1500. Two factors found to affect yield markedly were quick and even emergence after sowing (itself dependent upon good seed-bed and moisture conditions) and the time of singling. Singling when the plants were very small, having 4 leaves only, resulted in higher yields than singling at any later stage. Singling too late was found to produce an average loss of 2·6 tons per ha. Optimal density is given as approximately 80,000 plants per ha. before singling, but the average density for Limburg is not more than 60,000. Herein, however, differences in drill width, which varied from 35 to 55 cm., appeared to have no effect. Beet shape considerably affected yield, which was approximately 10% less from forked than from conical beets. A marked correlation was found to exist between beet shape and the condition of the seed-bed, and a further correlation between emergence, whether quick and regular or the reverse, and beet shape.—G.M.R.

636 Sneyers, R. Variations régionales et influences climatiques dans quelques rendements de la betterave sucrière en Belgique. [**Regional variations in, and climatic influences on, some yields of sugar-beet in Belgium.**] *Bull. Inst. agron. Gembl.* 1957, **25**, No. 1–2, 198–211, bibl. 9.

The results are given from a statistical analysis of the variations found in sugar-beet yields in different regions of Belgium, in different years.—E.B.O.

637 Uhlen, R. and others. L'action d'un Comité Technique betteravier dans une région de petite culture. [**The action of a Technical Committee for Sugar-beet in a region of small-scale cultivation.**] *Bull. tech. Inform.* 1957, No. 122, 421–37, illus.

Information is given on sugar-beet-growing in Alsace, France, and on measures taken for controlling *Cercospora beticola*.—E.B.O.

638 Thompson, E. G. **Bolting in early sown sugar beet. Comparison of strains, 1957.** *Brit. Sug. Beet Rev.* 1957, **26**, No. 2, 61–2. [Nat. Inst. Agric. Bot., Cambridge]

The Bush strains E and N had consistently the lowest percentages of bolting in 1955–7 but Sharpe's Klein E gave equally good results in 1957.—E.B.O.

639 Stahl, C. **Investigations on the germination and some other qualities of beet-seed.** *Proc. internat. Seed Test. Ass.* 1957, **22,** No. 1, 258–67. [Danish State Seed Test. Sta., Copenhagen]

The studies reported were made on seed samples of Danish sugar-beet, fodder-beet and mangel. The percentages by number of seed clusters with 1, 2, 3 4 or 5+ seeds were 8, 65, 24, 3 and 0·2, respectively. More than 50% of the samples tested contained between 61 and 70% of 2-seeded clusters. The percentage of germinated clusters rose from 58 for those with 1 seed to 81 for those with 4 seeds. There was a pronounced tendency for the seeds in multi-seeded clusters to behave in a similar manner during germination ; i.e., either all tended to germinate together, or all were non-viable. The germination of seed in the field was about half that in the laboratory. Emergence in the field was similar for single- and multi-seeded clusters, with a slight inclination to favour those with a single seed. The community of fate of seeds in the same cluster was even more pronounced in the field than in the laboratory. In laboratory tests, 35% of all clusters produced 1 seedling, compared with over 50% in the field.—P.J.B.

640 Eifrig, H. Untersuchungen über Erhaltung der Keimfähigkeit von Beta-Samen. [**Investigations on the maintenance of germinating capacity in beet seed.**] *Proc. internat. Seed Test. Ass.* 1957, **22,** No. 1, 269–75, bibl. 6. [Samenprüfstelle Münster der Landw. Kammer Westfalen-Lippe, Germany]

The trials reported were carried out during 1951–5 with seed of the mangel varieties Eckendorfer Red and Eckendorfer Yellow and the sugar-beet varieties Dippes Type N and Dippes Type E. The seed was stored either in the laboratory in paper bags, or in a loft in sacks. Data are given of the moisture content of the seed taken at intervals from Oct. 1951 to Sept. 1955. The germination of both mangel varieties remained relatively constant until 1953, but thereafter declined relatively rapidly until late 1955, when germination percentages fell to 15–25% where the seed was stored in paper bags and to 50% where the seed was stored in sacks. The germination of both varieties of sugar-beet remained relatively constant over the same storage period, irrespective of storage method. The reason for the differences between the mangel and sugar-beet varieties was not known. There was no evidence of a seasonal rhythm in germination percentages.—P.J.B.

641 Donà dalle Rose, A. Sulla germinazione in campo della barbabietola in relazione ai valori della facoltà germinativa determinata in laboratorio. [**Field germination of sugar-beet in relation to the values of germinating capacity determined in the laboratory.**] *Agricoltura d. Venezie* 1957, **11,** No. 9, 479–505, illus. [Sta. Sper. Bieticolt., Rovigo, Italy]

Results from a laboratory- and a field-trial in which 3 types of sugar-beet seed were used showed a linear relationship between the values of germinating capacity in the laboratory and those of field emergence. A table, in which these 2 series of values are compared, shows a delay in field germination, and a final percentage of plants emerged in the field considerably lower than those emerged in the laboratory.—E.B.O.

642 Andersen, R. N. and Helgeson, E. A. [**Weed control in**] **Sugar beets.** [3 abstracts] *Rep. 13th N. Cent. Weed Contr. Conf.* [n.d.], pp. 120–3. [Received April, 1957]

Post-emergence treatment with dalapon at 4–6 lb./ac. gave good control of *Avena fatua*, and at 2 lb./ac., of *Setaria* sp. DCU, pre- and post-emergence, at 7·3 and 14·6 lb./ac. controlled *Setaria* sp., but the higher rate reduced the root-yields of sugar-beet.—M.P.

643 Gojmerac, W. L. **Phosphates as soil insecticides for the control of sugar beet root maggot.** *F.A.O. Pl. Prot. Bull.* 1957, **5,** No. 4, 59–60, bibl. 2. [N. Dakota Agric. Coll., Fargo, USA]

Organic phosphate insecticides used for seed treatment and mixed with fertilizers for control of the sugar-beet root maggot, *Tetanops myopaeformis*, reduced germination in the field drastically. Statistically significant higher yields of roots were obtained where American cyanamid 3911 and Hercules AC 528 were used. American cyanamid 3911 on carbon was less phytotoxic than when applied as an emulsion and appeared to protect beets from root maggot injury, both when mixed with fertilizer and when used for seed treatment. —J.K.L.

644 Helm, J. Versuch einer morphologisch-systematischen Gliederung der Art *Beta vulgaris* L. [**A morphologic-systematic classification of the species *Beta vulgaris* L.**]. *Züchter* 1957, **27,** No. 5, 203–22, bibl. 99, illus. [Dtsch. Akad. Wissensch., Gatersleben, E. Germany]

645 Roubaix, J. de and Lazar, O. Métabolisme respiratoire de la betterave sucrière. 7. Les substances inhibitrices contenues dans les glomerules de betterave sucrière. [**Respiratory metabolism of sugar-beet. 7. The inhibiting substances contained in the sugar-**

beet seed-clusters.] *Sucrerie belge* 1957, **76,** No. 5, 185–97, bibl. 12. [Raffinerie Tirlemontoise, Belgium]

646 Negovskiĭ, N. A. [**The photophase in sugar-beet.**] [Russian] *Agrobiologija* (*Agrobiology*) 1957, No. 2, (104), 89–93, bibl. 10. [All-Union Sci. Res. Inst. Sugar-beet, Kiev]

Experiments are reported which confirm that nutrients absorbed by the plants in their first year play an important role in the progress of the photophase during conditions which are unfavourable for this developmental phase (darkness or a deficiency of light). [See also *Fld Crop Abstr.* 6 : 184 ; and 7 : 147, 148.]—M.H.

647 Thorne, Gillian N. **The effect of applying a nutrient in leaf sprays on the absorption of the same nutrient by the roots.** *J. exp. Bot.* 1957, **8,** No. 28, 401–12, bibl. 5. [Rothamsted Exp. Sta., Harpenden, Herts]

In these tests made with sugar-beet and swedes, there is an indication that all the N and P and over 80% of the K applied to leaves was absorbed. The small amount of K remaining unabsorbed on the surface of the leaf was unaffected by K-supply to the root.—From author's summary. M.H.

648 Frömel, W. and Amberger, A. Über die Boraufnahme von Zuckerrüben im Verlaufe einer Vegetationszeit. [**The boron intake by sugar-beet during the course of its vegetative development.**] *Z. PflErnähr. Dung.* 1957, **78,** No. 2/3, 178–85, bibl. 8. [Hauptversuchsanst. f. Landw. Weihenstephan, Bavaria]

This paper is a contribution to the physiology of B-nutrition in sugar-beet. In pot experiments, in which B was supplied in addition to N, P, K and Mn, B-intake was studied by harvesting and analysing roots and leaves of sugar-beet after 11, 15, 19 and 27 weeks of growth. The B content decreased in the root and increased in the leaves. The B-content of the soil fell rapidly.—D.B.

649 Harvey, P. N. **The use of nitrogen for sugar beet.** *Brit. Sug. Beet Rev.* 1957, **26,** No. 1, 27–30, bibl. 5. [Norfolk Agric. Sta.]

Results from several years of trials to study the effect of N fertilizers on sugar-beet indicated that their effect varies greatly with the weather. From trials on light soil it is concluded that 4–4·5 cwt. of sulphate of ammonia per ac., in addition to P and K fertilizers, is the optimal quantity. The percentage of sugar in the root decreased where more than 3 cwt. of sulphate of ammonia was applied per ac. but owing to an increase in root weight there was no decrease in yield of sugar up to the 4·5 cwt. level. Up to this level any increase in noxious N in the root was insignificant. In trials on heavy loam soil, where cereal straw had been ploughed in before beet, the indications were that 4·5 cwt. of sulphate of ammonia per ac. is appropriate and that this amount might be reduced somewhat in the absence of straw residues.—E.B.O.

650† Friederich, H. Die Nährstoffversorgung der Pflanzen—ein dynamisches Problem ? Dreijährige Düngungsversuche an Zuckerrüben mit dem Ziel gradueller Angleichung der Düngerversorgung an den Verlauf der Nährstoffaufnahme bei gleich hohen, zeitlich gestaffelten Mineraldüngergaben. [**Nutrient supply to plants — a dynamical problem ? 3-year fertilizer trials with sugar-beet, with a view to a gradual adaptation of fertilizer supply to nutrient uptake, using split applications of equal amounts of mineral fertilizers.**] *Z. Acker- u. PflBau* 1957, **103,** No. 3, 233–72, bibl. 67. [Landw. Hochsch., Hohenheim]

N, P and K in various combinations and at various rates, were applied to sugar-beet at different times during the growing season. All treatments, with few exceptions, produced crops of similar yields, quality and nutrient content, indicating a great adaptation of plants in respect of their nutrient uptake. In absence of acute nutrient deficiencies, the performance of plants seemed to depend on hereditary properties and weather conditions rather than on the pattern of nutrient uptakes. The response to fertilizer was greatest at a time when the nutrient in question was in short supply. Consequently, late application of N tended to improve yields, and P and K were generally most effective as top-dressings when soil reserves were not available. Delayed application, especially of N, tended to increase sugar concentrations, possibly due to the better performance of the plant during the later stages of growth. Late application of part of the fertilizers is particularly indicated with high amounts or in irrigated areas, as well as for improving quality or counteracting too luxuriant growth in consequence of high nutrient uptake.—*Soils and Ferts* 20 : 1746.

651 MacKenzie, A. J. and others. **Growth and nutrient uptake of sugar beets in the Imperial Valley, California.** *Sug. Beet J.* 1957, **9,** No. 5, 400–7, bibl. 3. [S.W. Irrigation Fld Sta., Brawley, Calif.]

Sugar-beet, which yielded 20–30 tons/ac., produced 12 tons dry matter/ac. containing over 400 lb. N, 100 lb. P_2O_5 and 900 lb. K_2O. Increases in yield, dry matter and NPK uptake were obtained with addition of N fertilizer, even at 320 lb. N/ac. Most growth and N uptake occurred between January and early May, when top growth ceased, though roots continued to grow. The top/root ratio increased as N applications increased. Removal of the roots entailed the loss from the soil of up to 160 lb. N and 40–50 lb. P_2O_5/ac. ; removal of the tops entailed a loss of 200–250 lb. N/ac.—From authors' summary. R.B.

652 Newton, T. **Growing sugar beet under unusual conditions. Use of town sewage in Notts.** *Brit. Sug. Beet Rev.* 1957, **26,** No. 1, 31–2.

Information is given on a sewage farm on which 120 ac. of sugar-beet are grown with no additional fertilizers. In 1956 the yield was 11 tons of roots per ac.—E.B.O.

653 Boguslawski, E. and Jung, F. Versuche mit Reihen- und Kontaktdüngung zu Rüben und Getreide. [**Trials with row- and contact-placement of fertilizer for sugar-beet and cereals.**] *Landw. Forsch.* 1957, Sonderheft 10, 56–73, bibl. 18, illus. [Inst. PflBau u. PflZücht., Justus-Liebig Hochsch., Giessen, W. Germany]

Compared with spread manure, contact placement of fertilizer (drilled with the seed) delayed germination of wheat and severely damaged germinating seed of sugar-beet. Row manuring (4–8 cm. distant from, and parallel to, the seed row) was practicable for the sugar-beet only.—D.B.

FODDER-BEET AND MANGELS

654 Bakermans, W. A. P. Beschouwing over enige onderzoekingen bij voederbieten. [**Discussion of some investigations concerning fodder-beet-growing.**] *Suppl. 6 C.I.L.O. Stencil S2412* [n.d.], pp. 4, mimeo. [Received 1957]

The research discussed is aimed at determining the factors governing profitable fodder-beet-growing on the light, sandy soils of the Netherlands. Three have emerged as of importance, namely, the water table, the pH value and the Mg content of the soil. Some 50% of the soils studied had too low an Mg content. Manuring with Mg and K is discussed, and also problems of beet storage technique and of manurial treatment both in general and in relation to the keeping quality of fodder-beet.—G.M.R.

655 Cornford, C. E. and Powell, D. B. **Effect of gamma rays on the sprouting of stored mangolds.** *Nature, Lond.* 1957, **180,** No. 4593, 996, bibl. 4. [Rothamsted Fld Sta., Dunholme, Lincoln (C.E.C.), and Wantage Radiation Lab., Grove, Berks (D.B.P.)]

The Orange Globe variety of *Beta vulgaris* under certain conditions of harvesting and storage (from November to April) showed mean lengths of sprouts ranging from 5·7 to 0 in. after irradiation (from a ^{60}Co source giving a dose-rate of 100 rad./min.) with 0 to 20,000 rad. respectively.—M.H.

TURNIPS

656 Instituut voor Rassenonderzoek van Landbouwgewassen, Netherlands. Bericht over rassenkeuze. No. 228. Stoppelknollen, 1957. [**Report on the choice of varieties. No. 228. Turnips, 1957.**] *Suppl. 11 Landb Voorl.* 1957, **14,** No. 6, pp. 7.

The group of varieties known as "medium-length white purple tops", which occupied 96% of the total turnip area of the Netherlands in 1956, still holds the foremost place for combination of desirable qualities [see *Fld Crop Abstr.* 8 : 171], other types being of local importance only. Of the valuable group denoted, 57% are selections for early harvesting and 39% selections for late harvesting.—G.M.R.

CARROTS

657 Mukula, J. **On the decay of stored carrots in Finland.** *Acta agric. Scand.* 1957, Suppl. 2, pp. 132, bibl. 206, illus. [Agric. Res. Sta., Tikkurila, Finland]

Aspects considered include : microorganisms which cause decay in stored roots ; the effect of previous manurial treatments and injuries to the roots on storage losses ; the formation of wound periderm ; and the use of sand and fungicides for preventing storage decay. Combinations of tecnazene + propham or tecnazene + methyl ester of α-naphthaleneacetic acid, gave good control of Sclerotinea and Botrytis rots and inhibited sprouting.—P.J.B.

POTATOES

See also Abs. 634

658 Ministry of Agriculture, Fisheries and Food, England and Wales. **Potatoes.** *Bull. 94 Minist. Agric. Fish. Fd, England and Wales* 1957, pp. iv + 56, 26 × 15 cm., London : H.M.S.O., 3s. 6d.

659 Mededelingen van de Nederlandse Algemene Keuringsdienst voor Landbouwzaden en Aardappelpootgoed. De invloed van groeiomstandigheden (o.a. grondsoort) op de knolvorm van de Bintje. [**The influence of soil conditions on the shape of Bintje potatoes.**] *Meded. N.A.K.* 1957, **14,** No. 7, 84.

Crops of the variety Bintje grown on sandy soils contained a higher percentage of oval tubers than those grown on clay soils, irrespective of the shape of the seed potatoes used.—R.B.

660 Wollner, F. Um die Kartoffelsortierung. [**Potato grading.**] *Landbauforsch. Völkenrode* [n.d.] **7,** 9–11, bibl. 5, illus. [Inst. PflBau u. Saatguterzeugung, Forschungsanst. f. Landwirtschaft, Braunschweig-Völkenrode, W. Germany]

The possibility of using tuber weight, as a refinement of tuber size, for grading potatoes was investigated in vars. Flava, Bona, Ackersegen and Magna.—D.B.

661 Emilsson, B. Matpotatisens kvalitet och faktorer som påverkar densamma. [**The quality of culinary potatoes and factors which affect it.**] *Medd. 273 Jordbrtek. Inst., Uppsala* 1957, pp. 22, illus.

Topics discussed include : criteria of culinary quality in potatoes ; factors which affect quality ; the grading of tubers ; the importance of healthy seed potatoes ; and the relation between seed size, plant population and row width.—P.J.B.

662 Hilton, R. J. and Gamborg, O. L. **Factors in relation to tuber quality in potatoes. 4. Tuber metabolic stage and its influence on total solanine.** *Canad. J. Pl. Sci.* 1957, **37,** No. 4, 407–12, bibl. 9. [Univ. Alberta, Edmonton]

663 Barbier, R. La pomme de terre de contre-saison. [**Potatoes grown out of season.**] *Publ. Féd. nat. Product. Plants d. Pommes d. Terre* 1957, pp. 22, bibl. 11.

This is a study on growing potatoes in July-October in northern France. It is concluded that, with the varieties now available, summer-planted potatoes are of no practical interest in the north, because of the difficulty and expense of controlling mildew [not named] in the autumn. Planting in July, which allows 2 potato crops per year, may be of help in particular cases, e.g. for reproducing new varieties rapidly and for studying the effect of fungicides.—E.B.O.

664 Höppner, E. Zur Sortensystematik des derzeitigen Kartoffelsortimentes. [**The classification of present-day potato varieties.**] *Kartoffelbau* 1957, **8,** No. 6, 99. [Bundessortenamt, Rethmar, W. Germany]

Each year a list of new varieties is published together with their chief characteristics and their nearest relatives. Such lists for 1955 and 1956 are reproduced here and a tabulated description is given of the 1956/7 varieties : Datura, Delos, Hansa, Horsa, Ponta and Susanna.—D.B.

665 Boock, O. J. Variedades de batatinha (*Solanum tuberosum* L.). 1. Comportamento de 12 variedades procedentes da Holanda, Alemanha e Suécia. [**Potato (*S. tuberosum*) varieties. 1. Behaviour of 12 varieties from Holland, Germany and Sweden.**] *Bragantia* 1956, **15,** No. 15, 153–68, bibl. 4, illus., English summary. [Inst. Agron., São Paulo, Brazil]

In trials to compare 12 potato varieties in 3 localities in São Paulo State, the potatoes were grown in both the dry season (planted in March, harvested in June–July) and the wet season (planted in September, harvested in December-January). In the dry season the variety Merkur yielded best with 8000 kg./ha., (average of the 3 localities). In the wet season Konsuragis, Eigenheimer, Merkur and Jätte-Bintje gave the highest average yields, 17,700, 15,900, 14,400 and 13,500 kg./ha., respectively.—E.B.O.

666 Höppner, E. and Geidel, H. Stärkeleistungen der im Grünen Plan geförderten 12 Sorten. [**Starch production of the 12 (potato) varieties which are in demand for the "Green Plan."**] *Stärke Kartoffel* 1957, **2,** No. 6, 2–4, illus. [in *Kartoffelbau* **8,** No. 12]. [Bundessortenamt, Rethmar/Hann, W. Germany]

Graphs show how the % starch content and the starch production per ha. of each of 12 starch-potato varieties compare with the average for these values determined for 16 registered varieties. The tests were conducted during 1953–7 over the whole of Western Germany, and the data for the graphs were taken from the three 3-yr. moving averages. A brief description is given of the 12 varieties which are in demand as starch potatoes, viz. : Adelheid, Amyla, Capella, Carmen, Fabricia, Herkula, Horsa, Maritta, Ostbote [no graph given], Panther, Susanna and Urtica. Capella, Fabricia and Herkula head the list for starch yield, and Fabricia, Amyla and Capella for % starch content. Amyla is of special interest because it is a relatively early variety which stores starch at an early stage. —D.B.

667 Johansen, R. H. and others. **Potato variety trials.** *Bi-mon. Bull. N. Dakota agric. Exp. Sta.* 1957, **19,** No. 6, 19–25, illus.

668 Babb, M. F. and Dearborn, C. H. **Performance of fifty-five potato varieties in Alaska's Matanuska Valley.** *Bull. 23 Alaska Agric. Exp. Sta.* 1957, pp. 15, bibl. 5.

The results are given of 4 years' trials with 81 commercial potato varieties and numbered selections. The most commonly grown variety in Alaska, Arctic Seedling (the standard) was out-yielded consistently only by Knik, previously known by its test number, 57.44-3-46. Data are also given of : specific gravities and total solids content of tubers, average tuber size, eye depth, incidence of growth cracks and general appearance.—P.J.B.

669 Fernández, B. J. and Niederhauser, J. S. Las mejores papas en 1956. [**The best potato varieties in 1956 (in Mexico).**] *Agricultura téc., Méx.* 1957, No. 4, 22–3 and 45, illus.

670 Schechaj, R. Perspectiva del trabajo fitotécnico y de la producción de semilla de papa en la zona noroeste de la República Argentina. [**Prospects of the phytotechnical work, and of seed production, with potatoes in northwest Argentina.**] *Rev. agron. Noroeste argent.* 1957, **2,** No. 2, 369–400, bibl. 14, illus., English summary. [Esta. Exp. El Suncho, Catamarca Prov., Argentina]

Although the growing of early potatoes is important in the northwest of Argentina (north of the 28° lat.), there is no local production of seed

potatoes. Katahdin and White Rose, susceptible to *Phytophthora infestans*, are the only potato varieties grown in this area (and the whole of Argentina). Two potato crops can be obtained per year : one planted in spring and another in summer. An account is given of preliminary work carried out to develop the local production of seed potatoes and to introduce new early varieties, resistant to *Ph. infestans*.—E.B.O.

671 Joseph, E. and others. Étude des possibilités de production du plant de pomme de terre avec ou sans récolte hâtive dans différentes régions de la Suisse romande (y compris le Haut-Valais). [**A study of the possibilities of producing seed potatoes, with or without premature harvest, in different parts of French Switzerland (including the Haut-Valais).**] *Landw. Jb. Schweiz* 1957, **71**, No. 3, 269–302, bibl. 8, illus. [Fed. Agric. Res. Inst., Lausanne, and agricultural schools]

In Switzerland, an essential requirement for the certification of class A (virus-free) seed potatoes is the destruction of the tops by a certain date. To allow tuber development to proceed as long as possible, this date is subsequent to the flight of the vectors, but before the virus can descend to the tubers. Class B seed-potato tubers are allowed to continue growth to maturity. The producer is compensated for the lower yield of Class A seed potatoes by a higher price. To study the effects of growth conditions on yields of, and financial returns from, Class A seed potatoes, 3-yr. investigations were conducted, using Ackersegen and Bintje, in 13 localities in S.W. Switzerland at 435–1250 m. a.s.l. These investigations proved that chitting was essential for increasing yields of Class A tubers. It accelerated and improved development to such an extent that at the time of destruction of the tops there was an average increase of 50–55 kg./are over non-chitted tubers. Of this increase, 40 kg./are were made up of potatoes having the required cross section of 35-50 mm. When the seed-potato crop was allowed to grow to maturity, the yield increase of chitted over non-chitted tubers was not marked. Altitude influenced yield through its effect on the length of the growing period which, for Class A seed potatoes, is from planting to destruction of tops. An altitude of 600–900 m. gave the best returns. Land at altitudes higher than 900 m. can be used for Class B seed potatoes, but below 600 m. the risk of heavy infection is too great. An early to medium-early virus-resistant variety is required for seed-potato production at altitudes below 600 m.—D.B.

672 Eidgenossische Alkoholverwaltung. Switzerland. Die Förderung der inländischen Saatkartoffelproduktion. *Schweiz. landw. Mh.* 1957, **35**, No. 11, 497–530, illus.

L'encouragement de la production indigène de plants de pommes de terre depuis 1952. [**Promoting the home production of seed potatoes.**] *Rev. rom. agric.* 1957, **13**, No. 10, 73–88, illus.

The report is concerned with : (1) progress since 1952 in the production of home-grown seed potatoes ; (2) home production and import as regards quality, price, requirements of the home market for seed potatoes, and production in the supplying countries, viz., Netherlands, France, E. and W. Germany, Poland and Denmark ; (3) the economic importance of the home production of seed potatoes ; and (4) the future of seed-potato production in Switzerland as regards acreage, management and economic considerations.—D.B.

673 Alban, E. K. [Summarizer] [**Weed control in**] **Potatoes.** [2 abstracts] *Rep. 13th N. Cent. Weed Contr. Conf.* [n.d.], pp. 139–40. [Received April, 1957]

Lay-by treatments using simazin (1–2 lb./ac.) and Geigy 444 (5 lb./ac.) gave reasonably good control of grasses (*Setaria* spp. and *Digitaria* sp.) without injury to crops. In another trial, pre-emergence application of dinoseb (6 lb./ac.) alone or in combination with other herbicides, gave over 90% control of annual broad-leaved weeds.—M.P.

674 Rosser, W. R. **Potato blight control trials in the West Midland Province [of England], 1950-54.** *Pl. Path.* 1957, **6**, No. 3, 77–84, bibl. 3, illus. [N.A.A.S., Wolverhampton]

The effects of protective spraying against *Phytophthora infestans* with copper oxychloride at 5 lb. in 100 gal. of solution/ac. and haulm-destruction with sodium chlorate at 30 lb. in 100 gal. of solution/ac. on the yield of blighted tubers and total yield of King Edward potatoes are reported. Haulm-destruction in early- or late-August reduced the weight of blighted tubers at the expense of total yield. Mid-September haulm-destruction caused no significant reduction either in the weight of blighted tubers or total yield.—M.P.

675 Grainger, J. **Blight — the potato versus *Phytophthora infestans*.** *Agric. Rev., Lond.* 1957, **3**, No. 5, 10–26, bibl. 31, illus.

The Cp/Rs ratio (where Cp is the weight of total carbohydrate in the whole plant and Rs the residual dry weight of the shoot), proved to have a close and consistent relation with the disease potential of the potato for blight and with the severity of attack by blight when the disease occurred. Other aspects considered are : blight forecasting ; crop phenology and blight, and the control of *Ph. infestans*.—M.P.

676 de Lint, M. M. Ontsmetting van pootaardappelen tegen de Rhizoctonia-ziekte. [**Disinfecting seed potatoes to combat *Rhizoctonia* scab-fungus.**] *Meded. N.A.K.* 1957, **14**, No. 7, 83.

Experiments carried out on clay soils showed that disinfecting scab-infested seed potatoes by organic compounds containing Hg [rate not stated] not only reduced the incidence of the disease by more than half, but also caused the plants to produce more stems and a greater number of tubers of 35–45 mm. ware size. Other methods described are : fumigation with formaldehyde gas, and soil treatment with pentachlornitrobenzene. The latter was not recommended for table potatoes as it imparts off-flavours ; it controls other fungus diseases besides *Rhizoctonia*.—R.B.

677 Broadbent, L. and others. **The cost of using insecticides to maintain the health of potato seed in England and Wales.** *Quart. Rev. N.A.A.S.* 1957, No. 38, 144–52, bibl. 2.

678 Broadbent, L. and others. **The effect of date of planting and of harvesting potatoes on virus infection and on yield.** *Ann. appl. Biol.* 1957, **45,** No. 4, 603–22, bibl. 12, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

Experiments during 1953–6 tested the effects of early and late planting of King Edward potatoes on the incidence of virus diseases in the tubers and the suitability of the tubers for seed. Plantings were made each month from April to August and tubers were lifted after 12 weeks' growth or after the haulms had died. Crops planted in mid-April and harvested in early July produced the fewest virus-infected tubers. Planting in April and lifting at the end of the season produced most ware-sized tubers. In plots lifted after 12 weeks, May- or June-planting produced more ware than April-planting. Most seed-size tubers were produced by the late-lifted May- or June-plantings. The date of lifting had little effect on the total number of tubers, but the date of planting affected it greatly. Most tubers were usually set by the May plantings and the number decreased with successive plantings. Healthy or virus-infected mature seed produced a bigger crop in the subsequent year than immature seed obtained by early lifting or late planting. Late-planted tubers produced more main stems than those planted at the normal time, but growth of axillary shoots was reduced and total leaf-area remained small.—From authors' summary. M.H.

679 Lihnell, D. Några olika potatissorters förhållande till ringröta. [**The reaction of some potato varieties to ring rot.**] *Växtskyddsnotiser* 1957, **21,** No. 2, 28–30, illus.

In trials in Sweden during 1956, tubers of each of 14 varieties were inoculated with ring rot (*Corynebacterium sepedonicum*) one week before planting. The inoculated tubers produced plants which grew normally until late Aug., when signs of withered foliage began to show in some varieties. Harvesting took place in early Oct. and the tubers were examined for ring rot after 2 months' storage. The varieties Alpha and Elsa appeared to be almost completely resistant and no ring rot was noted in their tubers ; Anna and President also showed resistance. Ackersegen, Birgitta, King Edward, and Magnum Bonum appeared to be particularly susceptible.—P.J.B.

680 Plaisted, P. H. **Growth of the potato tuber.** *Pl. Physiol.* 1957, **32,** No. 5, 445–53, bibl. 39. [Boyce Thompson Inst., Yonkers, New York]

Observations made on field-grown potato plants showed that the first stolons were produced on the lower subterranean nodes near the seed-piece and the point of origin of the stolons moved progressively up the stems as the plants grew older. The first tubers were formed on the lowest stolons and tended to become dominant and the largest. Histological studies showed that tuber growth was due to increases in both cell number and cell size ; cell enlargement accompanied cell multiplication throughout the range of tuber sizes studied, i.e. from less than 50 mg. up to 200 g. Tuber size was more directly related to increases in cell number than to increases in cell size. During the period of tuber growth, cell volume, fresh weight per cell, protein per cell, and cell-wall material per cell-unit, all increased by about 4% per day, while the dry weight per cell, non-reducing sugars and starch per cell, alcohol-soluble N and ash per cell increased by about 5% per day. The potato tuber appeared to be unusual among plant tissues by reason of its long-continued meristematic activity. Techniques for measuring cell numbers and cell size in potato tubers are described.—P.J.B.

681 Eichinger, A. Über die Bildung der Reservestärke in den Knollen der Kartoffelpflanze. 2. [**The formation of reserve starch in the tubers of the potato plant. 2.**] *Z. Acker- u. PflBau* 1957, **104,** No. 1, 25–38, bibl. 8, illus.

This discussion on the chemistry of starch formation in potato tubers is a continuation of the paper referred to in *Fld Crop Abstr.* 10 : 635.—D.B.

682 Germann, O. Über den Einfluss des Abkeimens auf die Ertragsfähigkeit der Pflanzkartoffel. [**The influence of sprout removal on productivity of seed potatoes.**] *Landbauforsch. Völkenrode* [n.d.], **7,** No. 1, 19–21, bibl. 6, illus. [Inst. PflBau, Forschungsanst f. Landwirtschaft Braunschweig-Völkenrode, W. Germany]

The effect of sprout removal on subsequent sprout formation, chemical changes in the tubers, development of tops, and yield of tubers was studied in Vera and Olympia, potato varieties which have different periods of dormancy.—D.B.

683 Szalai, I. and others. **Metabolic changes in sprouting potato tubers treated with " rindite."** *Acta Biol. Acad. Sci. Hung.* 1957, **8,**

No. 1, 11–19, bibl. 13, illus., German and Russian summaries. [Inst. Pl. Physiol., Szeged Univ.]

The results of the experiments described showed that response of the plants to rindite (a 7 : 3 : 1 mixture of ethylenechlorhydrin, ethylene dichloride and carbon tetrachloride) was variable, depending on the potato variety. In strains sensitive to agents which stimulate sprouting, rindite vapour induced qualitative changes in the metabolism of young tubers, these changes, in general, being characterized by a sudden transition from synthesis to decomposition.—M.H.

684 Ramanujam, S. and others. **Seed-treatment for breaking dormancy of potatoes.** *Indian J. agric. Sci.* 1957, **27**, No. 1, 35–48, bibl. 13. [Cent. Potato Res. Inst., Patna]

Soaking potato setts in a 1% aqueous solution of thiourea for 1 hr., before planting, is a simple, safe, successful and cheap method for breaking dormancy of freshly-harvested tubers. The method can be used for large-scale cultivation.—From authors' summary. D.B.

685 Rappaport, L. and others. **Sprouting, plant growth and tuber production as affected by chemical treatment of white potato seed pieces. 1. Breaking the rest period with gibberellic acid.** *Amer. Potato J.* 1957, **34**, No. 9, 254–60, bibl. 13. [Dep. Vegetable Crops, Univ. California, Davis]

Gibberellic acid accelerated sprouting of newly dug White Rose, Kennebec and Russet Burbank potatoes by 2–3 weeks ; 5- and 90-min. dip-treatments were equally effective. Concentrations of 50, 500 and 2000 mg./l. produced comparable stimulation. Differences among varieties were observed. GA failed to overcome dormancy induced 3 months earlier with 6 mg./l. MH.—From authors' summary. R.B.

686 Birecki, M. and Szulc, J. Wpływ długości okresu jarowizowania na wzrost i rozwój ziemniaków oraz wysokość i jakość plonu. **The influence of the length of the vernalization period on growth and development of potatoes, quantity and quality of yields.** *Rocz. Nauk Roln. Ser. A* 1957, **74**, No. 3, 583–614, bibl. 13, illus., Russian and English summaries.

From a comparison in Poland of early, medium-early and late types of potato, it was observed that only after prolonged drought in the second half of summer were yields of early types higher than those of late varieties. The influence of vernalization is evident in years of unfavourable conditions during the second half of the vegetation period, the optimum temperature for vernalization being 10–16°C., and the optimum duration of the vernalization period (for Pierwiosnek) being 20–30 days. Late varieties react to 20-day vernalization only slightly, the optimal duration being 45–60 days (at 10–16°C.). Although the results obtained with certain varieties cannot be applied in full to the varietal groups which they represent, the data indicate the reaction of the types to the period of vernalization which is expressed in a shifting of the upper optimum time of vernalization (depending on the life-span of the variety).—From authors' summary. M.H.

687 Pohjakallio, O. and others. **Analysis of earliness in the potato.** *Acta agric. Scand.* 1957, **7**, No. 4, 361–88, bibl. 36, illus. [Dep. Pl. Path., Univ. Helsinki, Finland]

Field and laboratory trials with 21 potato varieties and clones showed that time of flowering varied markedly with the variety or clone but was independent of day length or light intensity. The duration of flowering was influenced by photoperiod but was independent of the quantity of light received by the plant. Flowering was brief under short day-lengths, when haulm- and stolon-development was rapid and death earlier, and more abundant under long than short photoperiods, even when the amount of light received by the plants was the same. The flowering of clones from hybrid species began earlier and was of longer duration than that of the commercial varieties. Light-treatment prevailing at sprouting also affected subsequent vegetative growth of the plants. Long day-lengths retarded the onset of tuber formation in all varieties and clones ; after onset, short day-lengths accelerated tuber formation and increased the dry-matter content of tubers and haulms, for a while. Yields were greater, at the first lifting (early August) from plants grown under short photoperiods, whereas plants grown under a long photoperiod generally gave higher yields at the 2nd harvest date (mid-Sept.), except when the haulms of the short-day plants had persisted and were consequently still contributing to tuber development. The haulms of early-flowering varieties of *Solanum tuberosum*, and in some cases also of plants under short photoperiods, were attacked earlier and more severely by *Phytophthora infestans* than were the haulms of late-flowering varieties.—M.P.

688 Leszczenko, P. and Malec, K. Badanie reakcji odmian ziemniaków na sztuczne niszczenie masy liściowej. **Investigations on the reaction of potato varieties to artificial destruction of leaves.** *Rocz. Nauk Roln Ser. A* 1957, **74**, No. 3, 651–6, bibl. 3.

[Not abstracted]

689 Anan'ina, V. M. [**Protoplasm viscosity in the potato plant in relation to resistance of the crop to frost.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1957, **116**, No. 1, 153–6 [half of p. 154 is duplicated on

p. 155], bibl 12. [Polar/Alpine Bot. Gdn, Kola Filial Acad. Sci., USSR]

The tests were made in the Murmansk Province on experimental plots of the above Garden during 1953–5. The object was to examine the influence of ammonium nitrate (and other compounds noted below) on the resistance of the potato plant to frost and the effect of the compounds on viscosity of the protoplasm in leaf tissue. Before planting, tubers were placed in the various solutions for 24 hr. at 16–18°C. Concentration of the solutions varied between 0·25 and 0·01%, depending on the compound used. There is evidence that viscosity of the protoplasm in leaf tissue (determined by the plasmolytic method) is lowered by treatment, the extent of this influence depending on solution used : ((1) NH_4NO_3 ; (2) $KAl(SO_4)_2$; (3) $MgSO_4$; (4) $MnSO_4$; (5) H_3BO_3), and plant growth-stage. For example, viscosity is lowered from 28·3 min. (control) to 7·3 min. by (2) when the plants are at the vegetative phase. There is also evidence from phenological observations that (1) and (4) advance plant development by 2 – 3 days earlier than the control. This is of great importance in the Murmansk Province where the vegetative period is only 90–95 days. It is also shown that the resistance of the potato plant to 4° of frost under conditions of the test is induced by (1) at a concentration of 0·25% and (4) at a concentration of 0·05 or 0·01%.—M.H.

690 Unrau, A. M. and Nylund, R. E. **The relation of physical properties and chemical composition to mealiness in the potato. 1. Physical properties.** *Amer. Potato J.* 1957, **34,** No. 9, 245–53, bibl. 8, illus. [Minnesota Agric. Exp. Sta., St. Paul]

Organoleptic tests on 2 varieties of potato in 1953 and on 3 varieties in 1954 confirmed that potatoes of the same variety which differed in sp. gr. differed also in mealiness. Potatoes of different varieties but of identical sp. gr. also differed in mealiness, depending on the varieties compared. Physical characteristics apparently associated with mealiness are listed. The size of starch granules in raw tubers was apparently not associated with mealiness.—From authors' summary. R.B.

691 Loizides, P. A. **Fertilizer experiments in Cyprus. 1. Experiments with potatoes, cotton and onions.** *Emp. J. exp. Agric.* 1957, **25,** No. 100, 278–90, bibl. 9. [Dep. Agric., Cyprus]

Results are given of trials with irrigated crops of the potato variety Arran Banner and the cotton variety Coker 100.—M.P.

692 Birecki, M. and Behnke, S. Zastosowanie w przechowalnictwie ziemniaków preparatów chemicznych hamujących kiełkowanie. **The use of chemical preparations for inhibiting sprouting during potato storage.** *Rocz. Nauk Roln. Ser. A* 1957, **74,** No. 3, 665–702, bibl. 35, Russian and English summaries.

This subject constitutes a relatively new problem in Poland, and the following conclusions are drawn from the limited data available : (1) 6% TCNB (tetrachloronitrobenzene) applied at 1·5 – 2 kg./ton tubers reduces weight losses in tubers to a minimum, checks sprouting and counteracts rotting ; (2) it is not yet known whether TCNB has a deleterious influence on the taste of stored potatoes nor whether it induces toxic properties in them ; (3) there is indication that 6% TCNB decreases crop yields and produces a high percentage of deformed tubers.—M.H.

693 Brook, M. and Chesters, C. G. C. **The use of tetrachloronitrobenzene isomers on potatoes.** *Ann. appl. Biol.* 1957, **45,** No. 4, 623–34, bibl. 10, illus. [Bot. Dep., Univ. Nottingham]

In laboratory and field experiments from 1952 to 1955, 2,3,5,6-tetrachloro-1-nitrobenzene (tecnazene) delayed the development of sprouts on treated potato tubers, and 2,3,4,6-TCNB retarded sprout development in two laboratory experiments. —From authors' summary. M.H.

694 Alvim, P. de T. and others. Efectividad del tratamiento fitohormónico para el almacenaje de papas en las zonas altas en los Andes. [**Effectiveness of phyto-hormonal treatment for storing potatoes in the high zones of the Andes.**] *Turrialba* 1957, **7,** No. 3, 65–71, bibl. 6, illus., English summary. [Inst. Interamer. Cienc. Agríc., Lima, Peru]

Results are given from a trial to control sprouting in stored potatoes in a typical potato region of the Peruvian Andes. The potatoes were stored in paper-lined, wooden bins in a room at 9·5°–15°C. The samples consisted of 1000 kg. of tubers (variety Casablanca) per treatment. The methyl ester of NAA at 30, 60 and 100 mg. per kg. of potatoes was mixed with dry soil and 1 kg. of the mixture applied to 100 kg. of tubers. After 5 months data were obtained on : total weight of sprouts ; percentage of sprouted tubers ; final weight of tubers ; percentage of moisture ; vitamin-C- and sugar-contents ; cooking time ; appearance and palatability. Very satisfactory results were obtained from the 100 mg./kg. treatment. Lower concentrations of the chemical were not effective. —From authors' summary. E.B.O.

695 Contreiras, J. and Baptista, J. E. A acção da hidrazida maleica na conservação da batata. Efeito anti-abrolhante. Estudo comparativo da respiração (Qo_2), do teor em anidrido carbónico dos tecidos e da anatomia, em tubérculos tratados e não tratados. [**The action of**

maleic hydrazide on potato conservation. Anti-sprouting effect. Comparative study of respiration (Qo_2), of the carbon dioxide content in the tissues and of the anatomy, of treated and untreated tubers.] *Agron. lusit.* 1956, **18,** No. 4, 301–49, bibl. 74, illus., English summary.

An account is given of field trials carried out in 1952–3 to determine the dose of MH needed to inhibit sprouting of stored potatoes, under the conditions prevailing in certain regions of Portugal. Laboratory investigations were also carried out to study the mechanism of this inhibition. MH applied at 0·5, 1·5 and 2·5 kg. active principle/ha. reduced significantly the development of sprouts (but not their number) and the total losses (calculated as percentage of the initial weights) during storage. This reduction was most marked (about 100% for total losses) for the 2·5 kg./ha. treatment, applied as a spray 2·5 months before harvest. There were no significant differences between the yields of treated and untreated plots.—E.B.O.

696 Landi, R. Conservazione delle patate e idrazide maleica. [**Potato conservation and maleic hydrazide.**] *Genet. agr.* 1957, **7,** No. 1–2, 61–70, bibl. 8, illus.

Treatment of the potato varieties Voran and Ackersegen in the field with MH (sodium salt, 40% a.p.), applied as spray at different concentrations and different dates, was effective for controlling sprouting of the tubers in storage. The highest concentration tested, 6 parts per 1000, was the most effective and the best time of application was 31 August, 3 weeks before harvest. Varietal differences were noted.—E.B.O.

697 Pätzold, C. and Weiss, H. M. Beeinflussung der Kartoffelknolle durch Gammastrahlen radioaktiven Kobalts (^{60}Co). [**Effect of gamma rays from radioactive cobalt (^{60}Co) on potato tubers.**] *Angew. Bot.* 1957, **31,** No. 4, 93–105, bibl. 11, illus. [Forschungsanst. Landw. Braunschweig-Völkenrode (C.P.) and Abt. f. Atomphysik der Physikal.-Tech. Bundesanst. Braunschweig, W. Germany]

Gamma rays from ^{60}Co inhibited the sprouting and reduced the loss of weight of stored potato tubers. A relatively weak irradiation of from 300–1000 r. delayed germination and reduced the weight-loss of tubers during a limited period of storage (6 months). Irradiation with 8000 r. was effective for a much longer period (10 months). There was no difference in reaction whether the apex or base of the tuber was exposed to radiation. Tubers irradiated with 8000 r. lost less water, dry matter, starch and vitamin C, after 6·5 months' storage, than did the untreated tubers.—D.B.

698 Burton, W. G. and Hannan, R. S. **Use of γ-radiation for preventing the sprouting of potatoes.** *J. Sci. Fd Agric.* 1957, **8,** No. 12, 707–15, bibl. 12, illus. [Ditton Lab., Nr. Maidstone, Kent]

Potato tubers of the variety Dr. McIntosh received irradiation doses of 3500–35,000 r. at several intervals after harvesting. Sprout-growth was inhibited by doses of 8000–8500 r., 5000–5500 r., and in one small sample by 3500 r. A dose of 2000 r. did not inhibit sprouting but retarded it markedly. After storage for 6 months or more, sweetening rendered the tubers unsuitable for crisp- or chip-production, and after 15 months a great accumulation of sugar and complete tissue breakdown was observed. Irradiation at 20,000 r. and over increased the initial rate of water loss and subsequent wilting. Irrespective of irradiation there was an apparent, direct correlation between the rate of water loss and the cumulative loss which had occurred. No difference was seen between the effectiveness of irradiation at 8000–8500 r. within 1 week of harvesting, or after storage of 4·4°C. for 8–24 weeks or at 10°C. for 8 weeks. With high irradiation doses it would seem preferable to irradiate some weeks after harvest.—M.P.

699 Heiligman, F. **Effects of ionizing radiation on white potatoes.** *Amer. Potato J.* 1957, **34,** No. 6, 153–7, bibl. 2, illus. [Quartermaster Fd and Container Inst. for Armed Forces, Chicago, Illinois]

Samples of tubers were harvested in October, 1955, irradiated in November with doses ranging from 5 to 200 kilorep, before storage for 1 or 2 months at temperatures of 13 or 22°C. Doses of 5 kilorep permitted the formation of small, abnormal sprouts after storage for 2 months at 13°C. At rates of 10 kilorep, sprouting occurred only sporadically at 22°C., and no sprouts formed after storage at 13°C. for 2 months. Rates of 15 kilorep completely inhibited sprouting. Weight losses and decay were lowest in samples which received the lowest doses of irradiation.—P.J.B.

700 Gustafson, F. G. and others. **Influence of gamma irradiation of potato tubers on the rate of respiration.** *Amer. Potato J.* 1957, **34,** No. 6, 177–82, bibl. 4, illus. [Engng Res. Inst., Univ. Michigan, Ann Arbor]

Tubers of the varieties Sebago and Pontiac were exposed to irradiation doses of 0, 5, 15, 25, 50, 100 and 200 kilorep before being returned to storage at 45°F. for up to 22 weeks after treatment. Determinations were made of CO_2-evolution and O_2-consumption during storage. With the exception of tubers which received 5 kilorep, all treatments resulted in a marked initial increase in CO_2 evolution, followed by a decrease within 2 – 4 weeks after treatment. At the 13th week after treatment, tubers treated with 5, 15 or 25 kilorep had lower rates of CO_2 evolution than controls, while CO_2 evolution in tubers which received 50, 100 or 200 kilorep was still above that of controls. After

22 weeks of storage, tubers which had received 5 or 15 kilorep were still unsprouted and were slightly wilted ; higher doses of irradiation caused blackening, fungous infection and other disorders during storage.—P.J.B.

701 HOFSTRA, D. De glazen poterbewaarplaats. [**Glazed storage houses for seed potatoes.**] *Meded. N.A.K.* 1957, **14**, No. 4, 44–5, illus.

Post-war, improved, glass-walled potato stores are described, with information on temperature control, ventilation, and costs.—G.M.R.

702 COMMITTEE OF AGRICULTURE, STATES OF JERSEY. **States Experimental Station, Howard Davis Farm, Trinity, Jersey. Annual Report for 1956.** *Rep. States Jersey 1956*, 1957, pp. 81.

1. Early-potato-growing trials, 1956–7. By R. E. Johnstone, pp. 10–31. Four strains of Jersey Royal potatoes were stored under different conditions : (i) The seed potatoes were stood upright in seed boxes with the 1st shoots left intact, and (ii) prior to standing, the 1st shoots were rubbed off and the 2nd shoots left to develop. The potatoes were harvested 10, 11 or 12 weeks after planting. Treatment (i) resulted in a higher yield at 10 weeks, but (ii) gave better yields at 11 and 12 weeks, and better ground coverage in the early part of the season. The growing of strains of Jersey Royal on the 1st shoot could not be recommended. Early harvesting at 10 weeks impaired crop quality. Strain B was consistently the heaviest yielder. Jersey Royal sprouted as in (ii) above outyielded 6 English varieties grown from new seed (at all harvesting dates.). Yields of English varieties from new seed and as thrice-grown crops were similar. Seed-potatoes harvested at 13 weeks produced as early and as heavy a crop in the following year as did seed lifted at 16 weeks.

2. Potato-sprouting experiment. By J. M. Ewing, pp. 32–4. 2nd-shoot potatoes sprouted in a cold-store outyielded those traditionally stored in lofts by over 7·5 cwt. of tubers/vergée and all as ware potatoes. [1 vergée = $\frac{4}{9}$ ac.]

3. Control of potato root eelworm, *Heterodera rostochiensis*. By E. G. Thomas, pp. 64–79. Successive annual applications of DD at 40 gal. per vergée p.a. (540 lb./ac. p.a.) to eelworm-infested land for 3 years before planting the early-potato crops resulted in excellent growth of the crop and substantial yield increases. Application of DD between the early-potato crop and a 2nd crop of tomatoes was beneficial in the year of application and the year following.—M.P.

703 EVERETT, C. F. [**Weed control in**] **Potatoes.** [6 abstracts] *Res. Rep. Nat. Weed Cttee, E. Sect* [*Canada*] 1957, 14–19.

1. Effect of cultivation on potato production. Potato crops were subjected to 0 – 6 cultivations for weed control. The 4th, 5th and 6th cultivations were as shallow as possible. Marketable tuber yields where no cultivations were carried out averaged 266 bu./ac., compared with 312, 314 and 318 bu./ac. where 1, 2 and 3 cultivations were given, respectively. The use of 4, 5 or 6 cultivations resulted in slightly lower yields than where 1, 2 or 3 were used. *Agropyron repens* was not a problem on the plots used.

2. Effect of combinations of cultivation and herbicides on potato production. Keswick potatoes were planted on 25 May, 1957, and cultivated and ridged up to 6 times during 15 June to 27 July. Pre-emergence treatment with 3·6 lb. dinoseb alkanolamine salt/ac. was applied when 25% of the tops had emerged. Diuron, at 0·75 and 1·5 lb./ac. was applied as post-emergence, lay-by treatments on 6 Aug. Diuron resulted in highly significant yield reductions. Six cultivations + 6 ridgings gave the best control of *A. repens* and moderate control of *Polygonum persicaria*, *Galeopsis tetrahit* and *Chenopodium album*, but resulted in non-significant reductions in tuber yields. Dinoseb, combined with cultivation on 15 June and 13 and 27 July, resulted in good control of annual weeds, moderate control of *A. repens* and good tuber yields.

3. Effect of combinations of herbicides and cultivation on the control of couch grass (*Agropyron repens*) in potato production. Potatoes were planted on 31 May, 1957, on plots heavily infested with *A. repens*. Cultivation treatments were : nil, before emergence on 20 June, and late (at lay-by) on 27 July. Pre-emergence herbicidal treatments were made 5 days after the early cultivation and included: dalapon, dinoseb alkanolamine salt, CDAA and diuron. Diuron decreased tuber yields. Dalapon at 8 lb./ac. + dinoseb at 3·6 lb./ac. gave the best control of *A. repens* and good control of annual weeds ; it did not significantly reduce yields. Some cultivation was needed for best control of *A. repens*, but timing was not critical.

4. Herbicides for weed control in potatoes. Keswick potatoes were planted on 25 May, 1957, cultivated and ridged lightly on 15 June and a number of herbicides was applied in 50 gal. water/ac. three days after the cultivation when about 25% of the tops had started to emerge. CIPC, diuron and simazin reduced or damaged top growth and reduced tuber yields. Neburon and dinoseb gave the best weed control, with no tuber yield reductions.—P.J.B.

SWEET-POTATOES

704 HASEGAWA, H. and YAHIRO, T. **Effects of high soil temperatures on the growth of sweetpotato plant.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 1, 37–9, bibl. 7. [Kyushu Agric. Exp. Sta.]

The optimum soil-temperature for sweet-potatoes was 20–30°C. Above this, vines flourished at the expense of tuber formation. Plants suffered more from high soil-temperature by night than by day. It is concluded that the low yields of late-planted sweet-potato can be attributed to the high soil-temperature which [at the above location] is well above 30°C. for about 1 month after the rainy season, during which period the high soil-temperature persists during the night.—From English summary. D.B.

705 Kodama, T. and others. **Growth process of sweet potato plants grown directly from seed tubers. 1. Growth of tops and tuberous roots of sweet potato plants. 2. Histological studies on the development of tuberous roots. 3. Physiological changes in sweet potato plant in relation to growth.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **25,** No. 3, 147–8 and 175–7, illus., English summaries. [Kanto-Tosan Agric. Exp. Sta.]

1. During the early stages of growth, both the tops and underground parts of the sweet-potato plants grew more rapidly from seed tubers than from transplanted sprouts. Seed tubers sprouted 20 days, and emerged 30 days, after planting. The weight of the seed tubers decreased until late June, after which the tubers thickened to give large tubers. 3. The physiological changes concerned N content. Total N content decreased until the 80th day, after which it increased. Soluble N at first increased up to the 40th day and then decreased until the 80th day. Non-soluble N behaved conversely.—From English summaries. D.B.

706 Cibes, H. and Samuels, G. **Mineral-deficiency symptoms displayed by sweet-potato plants grown under controlled conditions.** *Tech. Pap. 20 Univ. Puerto Rico Agric. Exp. Sta.*, 1957, pp. 22, bibl. 3, illus., Spanish summary.

CASSAVA

707 Gaviria, M. H. Cultivo de la yuca. [**Cassava-growing (in Colombia).**] *Agric. trop., Bogotá* 1957, **13,** No. 7, 429–31.

708 Childs, A. B. H. **Trials with virus resistant cassavas in Tanga Province, Tanganyika.** *E. Afr. agric. J.* 1957, **23,** No. 2, 135–7. [Dep. Agric., Tanganyika]

Most of the cassava varieties on trial were 3rd back-cross hybrids from a cross between *Manihot utilissima* and *M. glaziovii*. Yields of all varieties were nearly twice as high when grown on the ridge than on the flat. 46106/27 and 4763/16 were selected for further multiplication as being suitable for the sandy and red soils, respectively, of Tanga Province. Both varieties were relatively virus resistant, good yielders and 'sweet'. Search continues for a virus-resistant cassava variety which is also bitter, and so unattractive to wild pigs.—M.P.

709 Fassi, B. Premières observations sur une pourriture des racines du manioc causée par un *Phytophthora*. [**First observations on a root rot of cassava (in the Belgian Congo) caused by *Phytophthora* sp.**] *Bull. Inform. I.N.É.A.C.* 1957, **6,** No. 5, 313–17, illus.

The control measures recommended are : to grow resistant varieties, such as Criolinha, which is also early and high yielding ; to use a long rotation ; to grow cassava at a high density (1 × 1 m.) ; to weed it, *Imperata* sp. being particularly noxious in spreading the disease ; to drain the soil ; to harvest the roots soon after they are mature.—E.B.O.

COCOYAMS

710 Purewal, S. S. and others. **The effects of various fertilizers in relation to spacing on development and yield of *Colocasia esculenta*.** *Indian J. Agron.* 1957, **1,** No. 4, 245–54, bibl. 11. [Govt Agric. Coll., Ludhiana, Punjab]

Compared with 1·5-ft. spacing, a 2-ft. spacing between rows produced a significantly greater (1) number of leaves, (2) height and leaf-area, and (3) yield per plant ; but when the economics of manuring and spacing were calculated the highest yield per acre (27,367 lb.) was obtained from 100 lb. N + 50 lb. P_2O + 50 lb. K_2O, with a row spacing of 1·5 ft., this because of the increased number of plants.—D.B.

JERUSALEM ARTICHOKES

711 Mann, H. H. **Jerusalem artichokes.** *Rep. Rothamsted Exp. Sta. 1956* Harpenden, 1957, 210–11.

The " topine " strain of Jerusalem artichoke gave the following yields at Woburn in 1954, '55 and '56 : 17·6, 9·4 and 14·1 tons of green tops/ac., containing 19%, 30% and 22% dry-matter, respectively. Tuber yields in the corresponding years were 14·5 and 13·5 tons/ac. The crop is considered to be promising for Britain.—M.P.

KALE

712† Munro, R. F. **Crop production investigation. Kale, 1956 crop. Cost structures and other figures.** *Econ. Dep. Rep. 44 W. Scot. Agric. Coll.* 1957, pp. 7 + append.

Crops of kale grown for grazing, or for cutting and carting off were included in the study.—M.P.

FIBRE CROPS

COTTON

See also Abs. 691

713 Lévêque, L. A. Rapport au gouvernement

de l'Afghanistan sur l'amélioration de la production cotonnière. [**Report to the Government of Afghanistan on the improvement of cotton production.**] *Rep. 569 F.A.O.* 1957, pp. 24.

Information is given on climate, soils, and methods of growing cotton now practised in Afghanistan. As a result of trials the variety Acala is recommended for most regions, with the exception of Taloqan where Coker, earlier than Acala, is probably best.—E.B.O.

714 Shaikh, A. M. and others. **Mixed cropping of cotton in Sind. 3.** *Pakist. Cotts* 1957, **1**, No. 12, 1–24, bibl. 13, illus.

Cotton was grown as a mixed crop with jowar [*Sorghum vulgare*] (sown at 2·5, 5 and 10 lb. per ac.) and its yield compared with cotton grown alone. The yield of fodder, harvested 10 weeks after sowing, increased with seed rate. The yield of cotton decreased with the seed rate of the fodder crop. From observations made on cotton plants tagged at random, the reduction in yield was a result of fewer cotton plants per unit area, fewer bolls per plant, fewer open bolls at picking time and a lower weight of seed cotton per boll. Manuring with $(NH_4)_2SO_4$ and NH_4NO_3, at 50 and 75 lb. N per ac., reversed these trends and increased the yield of cotton, but not to the level of cotton grown alone. Financial returns were higher from fodder and cotton grown on separate areas than when grown as a mixed crop.—D.B.

715 Du Bois, H. Types d'assolement en culture extensive de la zone cotonnière Nord. [**Types of rotation in extensive cultivation in the northern cotton area (of the Belgian Congo).**] *Bull. Inform. I.N.É.A.C.* 1957, **6**, No. 4, 227–41. [Sta. Rech. Agron., Bambesa]

From observations at Bambesa during 1941–54 on a long-duration trial in which 4 types of rotation, and 5 types of fallow or improving crop, were compared, it is concluded that, in the forest region, after either an improving crop of *Pennisetum purpureum* or a forest fallow, the rotation which begins with the association banana-cassava is the best and favours subsequent crops, mainly cotton. —E.B.O.

716 De Plaen, G. Délimitation des diverses régions cotonnières de la zone Nord. [**Delimitation of various cotton regions in the northern zone (of the Belgian Congo).**] *Bull. Inform. I.N.É.A.C.* 1957, **6**, No. 5, 285–300, bibl. 2, illus. [Sta. Rech. Agron., Bambesa]

In the northern zone of the Belgian Congo, where there are areas of forest and savannah, and where cotton is the principal cash crop, climatic- and soil-conditions are varied. The object of this paper is to delimit several cotton regions on the basis of the yields obtained, and to determine a suitable crop rotation for each of them.—E.B.O.

717 Orudžev, A. and Zaĭcev, V. [**The application of supplementary irrigation to cotton in winter under Azerbaĭdzan conditions.**] [Russian] *Hlopkovodstvo (Cotton Prod.)* 1957, **7**, No. 12, 28–32, illus. [Azerbaĭdžan Sci. Res. Inst. Cott. Prod.]

718 Brown, L. C. **Chemical defoliation of cotton. 7. Effectiveness of adjuvants under several specific plant and environmental conditions.** *Agron. J.* 1957, **49**, No. 10, 563–6, bibl. 18. [Dep. Agron., Univ. Arizona, Tucson]

The use of adjuvants with chemical defoliants increased both the amount and rapidity of defoliation when the chemicals were applied under limiting conditions such as those caused by wilted, toughened, inactive leaves, immature leaves and bolls, low temperatures, and excessive N application. Under favourable conditions, leaf fall was hastened, without a significant gain in total leaf-fall. Defoliation was not retarded in any of the experiments.—From author's summary. R.B.

719 Indian Central Cotton Committee. **A guide to Indian cottons. (Revised 1956).** 1956, Bombay : Indian Cent. Cott. Cttee, pp. 82.

This publication embodies, in a nutshell, the area, production, yield per ac., spinning performance and special characteristics of the different varieties of Indian cottons. The information has been collected and arranged by the Secretariat of the Indian Central Cotton Committee in consultation with the State authorities and the East India Cotton Association. The figures of acreage and production of the different varieties for 1955–6 could not be included as they are still incomplete. In order to facilitate inclusion of additional information as and when it becomes available from year to year up to 1960-1, space has been provided in the statement given under each of the different varieties.—From preface. D.B.

720 Negi, L. S. and Sehgal, S. L. **Improved strains of Punjab American cotton. 2. [Strain] 320 F.** *Indian Cott. Gr. Rev.* 1957, **11**, No. 2, 104–110, bibl. 2, illus., 1 map.

Strain 320 F is compared with LSS from which it was selected. It is erect, about 5·5 ft. high, adapted to a wide range of soil and climate, resistant to *Empoasca devastans*, early maturing (picking begins end of September), and gives a yield 8% higher than LSS and 21% higher than desi short-stapled cottons. It has a longer, finer, and stronger fibre than LSS and, because of its quality, commands a higher price. Released for distribution in 1957, it now occupies 65% of the total cotton acreage in the N.W. region of the Indian Punjab.—D.B.

721 Estrada, J. A. and others. Determinación de gossyplo en semilla de diferentes varie-

dades de algodón, en las pastas derivadas de éstas y en subproductos usados en la alimentación animal. [**Determination of gossypol in the seed of different cotton varieties, in the cakes made from it and in by-products used in animal feeding.**] *Agronomía, Lima* 1957, **24**, No. 89, 81–6, bibl. 5.

The results from chemical analyses for gossypol content in the seed of the cotton varieties Tangüis (10 strains), Pima and Acala showed rather high variations, the highest amounts (up to 1·5%) being found in the seed of cottons grown in the northern regions of Peru. [See also *Herb. Abstr.* 17 : 1735 ; 18 : 151, 678 ; and 20 : 889.]—E.B.O.

722 Simpson, D. M. **Long-time storage of cottonseed.** *Agron. J.* 1957, **49**, No. 11, 608–9, bibl. 4. [Tennessee Agric. Exp. Sta., Knoxville]

Samples of cotton seed remaining after earlier storage experiments were retained in storage in sealed containers at 33°, 70° and 90°F. for 19 years. The moisture content of the seeds ranged from 7 to 14%. Seeds containing 7% moisture stored at 70°F. showed 51% viability, but were slower in growing than fresh seeds. The only other seeds surviving were those stored at 33°F., of which those with 7, 9 and 11% moisture content showed no deterioration. Among seeds with 13% moisture content, deterioration was marked. Seeds harvested between 1932 and 1938 and kept in open storage until 1945 at Sacaton, Arizona, were then stored in sealed containers at 70°F. from 1945–57. From this experiment, some seeds 19–25 years old could still be germinated. The oldest viable seed was Pima H8 hybrid which gave 50% germination after 32 years' storage. [See also *Fld Crop Abstr.* 7 : 580.]—R.B.

723 Neves, O. S. and Freire, E. S. Adubação do algodoeiro. 1. Influência dos adubos, quando aplicados em contato com as sementes, sôbre a germinação. [**Cotton manuring. 1. Influence on germination of fertilizers applied in contact with the seed.**] *Bragantia* 1956, **15**, No. 21, 301–14, bibl. 1, English summary. [Inst. Agron., São Paulo, Brazil]

Results are given from a trial to study the effect on cotton-seed germination of N, P and K fertilizers.—E.B.O.

724 Pfeiffer, R. K. and Burleigh, R. **Experimental results with pre-emergence herbicides on Egyptian cotton in the Sudan.** *Emp. Cott. Gr. Rev.* 1957, **34**, No. 4, 269–79, bibl. 1, illus. [Gezira Res. Fm, Wad Medani, Republ. Sudan]

Dinoseb, PCP, monuron and CIPC were used as pre-emergence sprays at various rates. Dinoseb at 7–9 lb. and PCP at 10 pt. per feddan, [1 feddan = 1·038 ac.], gave satisfactory weed control lasting up to 4 weeks after spraying with some effect persisting even after re-ridging. Yields of seed cotton were increased by these 2 treatments over yields from untreated and unhoed controls and were similar to those from hoed plots. Monuron gave good weed control but adversely affected the plants and yields. Strip spraying with PCP on top of the ridges (12-in.-wide strips) gave poorer weed control and lower seed-cotton yields than PCP as an overall spray, but results of both treatments were better than from the unweeded plots.—From authors' summary. M.P.

725 Whitehead, M. D. and Brown, N. E. **In-the-furrow application of fungicides for the control of cotton seedling disease - damping-off and nub-root.** *Pl. Dis. Reptr* 1957, 419–23, bibl. 5, illus. [Missouri Agric. Exp. Sta.]

726 Unterstenhöfer, G. von. Die Bekämpfung von Pflanzenschädlingen durch Saatgutbehandlung mit systemischen Insektiziden. [**Control of insect pests by seed treatment with systemic insecticides.**] *Z. PflKrankh.* 1957, **64**, No. 7/10, 619–25, bibl. 12.

Thimet and disyston, esters of thionothiolphosphoric acid, applied to the seed of cotton as 50% activated charcoal formulations, protect the seedlings, for 3–7 weeks after emergence, from attack by thrips [*Frankliniella* sp.], leaf aphids [*Aphis gossypii*], and red spider [*Tetranychus* sp.]. These insecticides are also proving successful in protecting the following crops : broad bean from *Doralis fabae*, *Macrosiphum pisi* and *Sitona lineata* ; potato from *Myzus persicae* ; and sugar-beet from *Doralis fabae* and *Pegomyia hyoscyami*.—D.B.

727 Parencia, C. R. and others. **Further field tests with systemic insecticides employed as seed treatments.** *J. econ. Ent.* 1957, **50**, 614–17, bibl. 1. [Entomol. Res. Br., Agric. Res. Serv., U.S. Dep. Agric.]

In trials in Texas, thimet and Bayer 19639 were applied to cotton seed as a dust at a rate of 1 lb. active ingredient per ac. Both insecticides resulted in a significant reduction in thrips (*Frankliniella* sp.) numbers at 3 weeks after plant emergence. At 4 weeks after emergence, there were no significant differences from untreated controls. The cotyledons of treated seed showed some injury in all trials, but this was not serious. Phytotoxicity in true leaves was noted only where granular thimet was placed in drills closely below the rows of treated cotton seed. There were no differences between the emergence of treated and untreated seed. For controlling cotton fleahopper (*Psallus seriatus*) and overwintered boll weevil (*Anthonomus grandis*), foliage treatment with toxaphene was superior to the seed treatments.—P.J.B.

728 Almeida, P. R. and others. Ensáios sôbre o contrôle do pulgão do algodoeiro (*Aphis gossypii* Glover), por meio de tratamento das sementes com inseticidas sistêmicos e pulverizações concentradas. [**Trials on controlling aphid (*A. gossypii*) on cotton by treating the seeds with systemic insecticides and concentrated sprays.**] *Biológico, S. Paulo* 1957, **23**, No. 8, 145–56, bibl. 8, illus. [Inst. Agron. Campinas, Brazil]

Treatment of cotton seeds, immediately before sowing, with the systemic insecticide OMPA, applied in activated carbon to slightly wet seed at a concentration of 4% active principle in relation to the weight of the seed, and with 3911 (or thimet), applied in the same way, at 2 and 4% a.p., was highly effective in controlling *A. gossypii* on cotton during the first 43 days of plant growth (96–99% control). These treatments increased cotton yields by 75–77% over yields with the other treatments tested.—E.B.O.

729 Brazzel, J. R. and Gaines, J. C. **Cotton yield and quality losses caused by various levels of pink bollworm [*Pectinophera gossypiella*] infestations.** *J. econ. Ent.* 1957, **50**, No. 5, 609–13, bibl. 3. [Louisiana Agric. Exp. Sta., Baton Rouge]

730 McKinlay, K. S. **A preliminary note on the control of the red bollworm, *Diparopsis castanea*, with insecticides.** *Emp. Cott. Gr. Rev.* 1957, **34**, No. 4, 253–7, illus. [Colon. Pest. Res. Unit, Arusha, Tanganyika]

Endrin, sprayed at 0·25–0·5 lb. in 12 gal. per ac. gave good control of *D. castanea* on cotton. For complete control it was necessary to apply the insecticide weekly and to ensure complete cover of the cotton plants.—M.P.

731 Cavaleri, P. A. and Inforzato, R. Estudo do sistema radicular do algodoeiro nos três principais tipos de solo do Estado de São Paulo. [**Study of the root system of cotton in the three principal soil types of São Paulo State.**] *Bragantia* 1956, **15**, No. 24, 337–46, bibl. 4, illus., English summary. [Inst. Agron., São Paulo, Brazil]

The root system of the 2 cotton varieties under study was found to extend deeply into the soil, in some cases down to 2·5 m. The roots of I.A. 7387–24940 (generally known as Express) were more abundant, and extended to greater depth, than those of I. A. Campinas 817. As to soil type, the greatest depth was reached in mixed terra rossa, followed, in decreasing order, by clay soil, and "arenito de Bauru" [from sandstone]. In all cases, 80% of the root weight was found in the first 20 cm. of soil, irrespective of variety or soil type.—E.B.O.

732 Homès, J. Une amélioration dans la technique du greffage. [**An improvement in the grafting technique (of cotton).**] *Bull. agric. Congo belge* 1957, **48**, No. 4, 883–7, illus. [Univ. Libre, Bruxelles]

733 Bhatt, J. G. **Observations on the changes in morphological characters of the cotton plant by 2,4-D.** *Ind. Cott. Gr. Rev.* 1957, **11**, No. 3, 233–5, bibl. 5, illus. [Scheme for Cott. Physiol. Res., Indore]

An aqueous solution of 10 ppm. of the K salt of 2,4-D was sprayed at 80 gal. per ac. on *Gossypium arboreum* and *G. hirsutum* when at the square-formation stage. Within 24 hr., almost every plant exhibited curvature of the main stem. The growth substance caused the leaves to be deeply lobed, elongated and closely veined. The effect on flower structure varied considerably, producing a secondary calyx and the fusion of bracts and of petals.—D.B.

734 Hacskaylo, J. and Ergle, D. R. **Compositional and physiological responses of the cotton plant to the systemic insecticides schradan and demeton.** *Bull. 821 Texas Agric. Exp. Sta.* 1955, pp. 18, bibl. 41, illus. [Received Aug., 1957]

Cotton plants grown in culture solutions containing schradan accumulated insecticide in successively lower concentrations in leaves, roots, bolls, petioles and stems. Schradan concentrations of 10 ppm. stimulated vegetative development. Concentrations of 100 ppm. and over were phytotoxic to vegetative and fruiting activity. When concentrations of N or P (but not K) in the culture solution were reduced, schradan accumulated in the plant to a greater extent. Seed from schradan-treated plants contained more protein and less oil than normal ; demeton produced the reverse effect. As the schradan concentration in the solution increased, soluble N in the plant increased, but there was no effect on protein level. High levels of schradan application caused a decrease in total sugars, and increased starch production in the roots only.—From authors' summary. R.B.

735 Bederker, V. K. and others. **Studies in the agronomy of Gaorani cotton. 3. Manuring.** *Indian Cott. Gr. Rev.* 1957, **11**, No. 3, 346–79, bibl. 5. [Cott. Res. Sta., Nanded]

As a result of manurial and rotation experiments with the variety Gaorani 6 of *Gossypium arboreum* var. *neglectum*, conducted between 1941 and 1952, on poor, medium and rich soils in the Marathwada Division of Hyderabad State, it was recommended for this region that a legume should be included in the cotton rotation, the legume should be manured with 30 lb. P_2O_5 per ac. and the subsequent cotton crop with 30 lb. N per ac. The method of applying N was important for the medium and poor soils. In these soils, the drilling of the fertilizer with the seed gave better results

than broadcasting immediately or 2 weeks before sowing. N increased plant height, number of bolls per plant and yield. P was effective only in the presence of N. K is not a limiting factor on these soils.—D.B.

736 Sardah Singh and Sahasrabudhe, V. B. **Effect of organic and inorganics on the yield of jowar (*Sorghum vulgare*), arhar (*Cajanus cajan*) and groundnut (*Arachis hypogaea*) and after effect on rainfed cotton.** *Indian J. Agron.* 1957, **1**, No. 3, 151–7, bibl. 11. [Inst. Pl. Ind., Indore]

Application of 20 lb. N/ac. as $(NH_4)_2SO_4$ significantly increased grain- and fodder-yields of *Sorghum vulgare*, depressed the yield of *Cajanus cajan*, and improved production of *Arachis hypogaea*. Cotton matured a fortnight earlier and gave significantly higher yields of seed cotton when it was grown after *A. hypogaea* than after *S. vulgare* or *C. cajan*. Cotton responded to superphosphate and farm compost but not to ammonium sulphate when these were applied to the preceding crop.—D.B.

737 Ranga Rao, D. S. and others. **An account of cotton cultivation practices in the Bombay State based on the ancillary data of the crop estimation surveys.** *Indian Cott. Gr. Rev.* 1957, **11**, No. 3, 257–74. [Statistics Sect., Dep. Agric., Bombay State, Poona]

The survey, which is supported by several pages of tables, gives information on : the distribution and increase in area of improved varieties, spacing between rows, principal crop mixtures, crops grown in rotation with cotton, areas under irrigated cotton and under manured cotton, and the soil types on which cotton is cultivated.—D.B.

FLAX

738 Sizov, I. A. [**Cultivation of flax in the Soviet Union.**] [Russian] *Agrobiologija* (*Agrobiology, Moscow*) 1957, No. 5(107), 36–40. [All-Union Inst. Pl. Ind., Leningrad]

Information is given on : the history of flax production in the USSR ; the work of the All-Union Scientific Research Institute for Flax Production ; phasic development in regional varieties ; sowing dates ; cultivation measures and the use of fertilizers ; varieties and harvesting.—M.H.

739 Plonka, F. Les groupes géographiques de lin. [**The geographical groups of flax.**] *Ann. Amélior. Pl., Paris* 1957, **7**, No. 1, 109–38, bibl. 19, illus., English, German and Russian summaries. [Sta. Cent. Génét. Amélior. Pl., Versailles, France]

The cultivated varieties of flax (*Linum usitatissimum*) are classified into geographical groups having well-defined botanical characters. On the basis of bibliographical data, and the study of a collection of about 700 flax varieties at Versailles, an attempt is made to survey the different types of flax in the world. Three fundamental groups are distinguished for the countries where flax has been grown since ancient times : the Mediterranean ; the Eurasian; and the Indo-Abyssinian. Cultivated flax was introduced into the Americas mainly during the 19th century.—E.B.O.

740 Fröier, K. and Zienkiewicz, H. **Comparison between the action on fibre flax and weeds of nitrocresols (DNC-preparations), MCPA and mixtures between them.** *Proc. 3rd Brit. Weed Contr. Conf.* 1956, 351–5, bibl. 1. [Swedish Seed Ass., Svalöf]

A mixture of 1·042 kg. DNC + 0·256 kg. MCPA/ha. gave better weed control, higher seed and straw yields and higher quality straw than MCPA alone at 0·24 – 0·32 kg./ha. The best yield of straw and the best weed control were obtained on plots treated with 2·2 – 2·4 kg. DNC/ha., the highest seed-yield from the DNC and MCPA mixture and the greatest percentage of long fibre from 0·68 kg. dinoseb/ha. The DNC+MCPA mixture can be applied when the flax is 15 cm. high ; DNC and MCPA alone must be applied earlier.—From *Weed Abstr.* 6 : 482. M.P.

741 Suzuki, M. **Studies on fiber development in flax plants sown at various seasons.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **26**, No. 1, 55–7, illus. [Chiba Univ.]

Flax was sown at 10-day intervals between February and August, and, at each harvest, fibre development was studied in the internode between the cotyledon and the first branching node on the stem. Taking the mean values from 20 plants, the diameter of the fibre cells fluctuated between 30·7 and 36·2μ ; the diameter of the lumen steadily increased from 9·5 to 20·3μ (to 11 July sowing) ; and the thickness of the fibre-cell membrane decreased from 12·3 to 6·8μ.—From English summary and text tables. D.B.

742 Sørensen, K. Udbytteforholdet mellem spindhør og andre landbrugsafgrøder i 10-året 1946–1955. [**Yield of fibre-flax compared with other agricultural crops, 1946-55.**] *Lin* 1957, **11**, No. 3, 13–14, English summary. [Kolding Hørfabrik, Denmark]

A comparison has been made between fibre-flax and the main comparable competing crops grown in the flax-growing districts of Denmark, viz. barley, white- and red-clover for seed and meadow fescue for seed. The 10-yr. average of results showed the flax-crop to yield the greatest net profit per ha. Included in these investigations were flax-harvest financial returns from 32,818 ha.—J.K.L.

HEMP

743 Danell, N. Odlingsförsök med hampa åren 1948–1955. [**Experiments with hemp 1948-55.**] *Medd. 81 Stat. JordbrFörsök* 1957, pp. 20, German summary.

The results are presented of experiments carried out in Sweden. The hermaphrodite varieties gave 14% higher yield of total-fibre than the dioecious Schurig variety used as a control. Sowing as soon as the soil was warm enough, gave the highest fibre-yield ; sowing rates should be between 80–100 kg. per ha., with row-spacing as for cereals. In these experiments, harvesting took place at 15, 30 and 45 days after full bloom of the male flowers. The last harvest date gave the highest yield of fibre and seed. The crop should be well weathered in the field. The manuring experiments showed 500–600 kg. 40% K fertilizer per ha. to be most profitable ; N and P did not give consistent results.—J.K.L.

744 Singh, S. P. **Floral anatomy of *Cannabis sativa* L.** *Agra Univ. J. Res. (Sci.)* 1956, **5**, No. 1, 155–61, bibl. 6, illus. [Dep. Bot., B.R. Coll., Agra, India]

JUTE

745 Sen Gupta, J. C. and Chattopadhyay, S. K. **2. Effect of pre-sowing treatments with hormones on germination of some common Indian fibre crops.** *Bull. bot. Soc. Beng.* 1955 (issued 1956), **9**, No. 1, 10–13, bibl. 7. [Presidency Coll., Calcutta] [Seen Jan., 1958]

The effect of pre-sowing treatments with NAA and IBA on the germination of *Corchorus capsularis* (D.154), *C. olitorius* (Chinsurah Green), *Hibiscus sabdariffa* (N.P.5) and *Crotalaria juncea* (C.12) was followed from sowing to the establishment of healthy seedlings. The seeds were soaked in 10, 100 and 200 ppm. solutions of IBA and NAA for 24 hr. at room temperature. In all 4 species this treatment in general accelerated the rate of germination at the early stages, especially with the lower concentrations. In *C. capsularis*, *C. olitorius* and *C. juncea* germinations leading to normal healthy seedlings were inhibited. In all cases, the inhibition was proportional to the concentration of hormones used. The inhibitory effect of IBA was more pronounced in *C. capsularis* and *C. juncea*, and that of NAA in *C. olitorius*. In these 3 species some of the germinated seeds died after 7 days and this effect was more pronounced with higher concentrations. In *H. sabdariffa* the pre-sowing treatments increased the percentage of germination at some particular concentrations. All the germinated seeds survived to maturity.—From authors' summary. E.B.O.

746 Chakravarty, T. **Study of the decomposition of pectin by biological means with particular reference to the fibre-binding material in jute stem and cuttings.** *Bull. bot. Soc. Beng.* 1955 (issued 1956), **9**, No. 1, 22–31, bibl. 8. [Indian Jute Mills Assoc. Res. Inst., Calcutta] [Seen Jan., 1958]

The object was to study the growth of selected fungal and bacterial species on synthetic pectinous media and on media containing pectin (fibre-binding material) extracted from jute stem and cuttings. In pure condition the bacteria had no retting action on jute but mixtures showed some activity. Some 8 fungi had moderate to strong retting action on jute stem.—E.B.O.

KENAF

747 Bonfiglioli, O. L'*Hibiscus cannabinus*, pianta concorrente della juta può essere coltivata nella zona del riso. [***H. cannabinus*, a jute substitute, can be grown in rice areas.**] *Riso* 1957, **6**, No. 9, 10–14, bibl. 6, illus., English and French summaries.

A brief account is given of trials carried out in Italy, during 1951–6, to study the possibility of introducing kenaf (*H. cannabinus*). In Emilia, where most of the 1952 trials took place, the stem yield was 41,000–46,000 kg., and the fibre yield 3041–4332 kg./ha. In 1953, it was found that harvesting 120, 135 and 149 days from sowing, the percentages of fibre in the green stems were 7·6, 8·0 and 7·8, and the fibre yields were 3030, 3636 and 3939 kg./ha., respectively. In trials in Lombardy in 1955, the yield of stems (without leaves) was 52,000–98,100 kg./ha. From a trial in Novara province (Piedmont) in 1956 it was concluded that kenaf can be grown successfully in that region where it could replace rice to some extent. Kenaf cultivation could be completely mechanized. It would, however, be necessary to import the seed as kenaf does not produce seed in Italy. [See also *Fld Crop Abstr.* 10 : 1115.]—E.B.O.

RUSHES

748 Manchester, C. A. **Igusa : a critical cash crop in the rural economy of Okayama prefecture.** *Econ. Geogr.* 1958, **34**, No. 1, 47–63, illus. [Okayama, Japan]

The rush igusa (*Juncus effusus* var. *decipiens*), used for mat-making in Japan, is vegetatively propagated. It is planted at the end of Feb. in dry nursery beds 4 – 5 ft. wide, and the stems are then cut back to 8 in. In early August, the plants are separated and transplanted to heavily fertilized flooded nursery beds. During hot weather, the water is changed every 2 or 3 days. Transplanting into harvested rice fields is done in the lowlands at the end of December and in the highlands in mid-November, plants being placed 6 in. or more apart. The stems are harvested in mid-July of the

following year, dried, and woven into floor mats and other articles. This rush crop is usually alternated with rice, and though the yields of the following rice crop are lower than after wheat or barley, the incidence of rice diseases is substantially lower. Igusa has a very high N requirement.—R.B.

OIL CROPS

SESAME

749 Mazzani, B. Clasificación de variantes en *Sesamum*. [**Classification of variants in *Sesamum*.**] *Agron. trop., Maracay* 1957, **6**, No. 4, 195–201, bibl. 10, illus. [Cent. Invest. Agron., Maracay, Venezuela]

LINSEED

See also Abs. 863

750 Statens Forsøgsvirksomhed i Plantekultur. Denmark. Forsøg med sorter af oliehør 1953–1955. (Foreløbig meddelelse). [**Trials with varieties of linseed 1953-5.** (**Preliminary report**).] *Medd. 553 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1957, **61**, No. 1, 187–8.

The trials reported were carried out at 4 locations in Denmark. Of the 5 varieties, 4 were included in 11 trials and 1 variety in 8 trials. The 4 varieties Øtofte L. 47, Daehnfeldt Elite 6, Langelands B and Trifolium Rekord gave average seed yields of 15·9, 15·6, 15·3 and 15·2 hkg./ha., and oil yields averaged 597, 593, 552 and 561 kg./ha., respectively. The French variety Pastel, which was included in 8 trials, yielded 17·3 hkg. seed and 682 kg. oil per ha. Tendency to lodge was least in Pastel and Trifolium Rekord. A brief description is given of each variety.—J.K.L.

751 North Central Weed Control Conference. **13th Annual Research Report 1956.** [n.d.], pp. 189. [Received April, 1957]

Abstracts presented included :

Wild oat control in flax [linseed]. By R. S. Dunham and others, p. 501. CDAA and CP 9802 applied pre-emergence gave better control of *Avena fatua* at 6 lb./ac. than at 4 lb./ac., and were superior to other compounds tested. Subsequent yields were good, and the oil-content and iodine-number of the seeds were not lowered. Pp. 98–9, [4 abstracts]. Control of *Setaria viridis* and *S. faberi* with a number of herbicides is reported. The effect of the herbicides on the linseed crop and on disease development in flax is also given.—M.P.

752 van der Spek, J. De invloed der uitwendige omstandigheden op het effect van de ontsmetting van lijnzaad. **The influence of environment on the effect of linseed disinfection.** *Meded. LandbHogesch., Gent* 1957, **22**, No. 3, 535–45, English summary. [Phytopath. Lab., Wageningen]

The effect of seed disinfectants containing Hg and TMTD against the grey mould *Botrytis* and the foot-rot fungus *Ascochyta* was compared with that of the antibiotic P. Antibiotic treatments ranging from 1–4 g./kg. prevented fungal infestation where moderate watering was applied. The effectiveness of the other treatments diminished as watering increased. Rainfall influenced the length of time the disinfectant remained on the seed coat. *Ascochyta* was controlled less effectively than *Botrytis* as the former fungus took longer to develop.—From author's summary. R.B.

SUNFLOWER

753 Brown, D. A. **Effect of herbicides on yield of sunflower seed.** [Abstract] *Res. Rep. W. Sect. Nat. Weed Cttee* 1956, 100. [Exp. Fm, Brandon, Manitoba]

CIPC and TCA at 4 and 8 lb./ac. and CDAA at 4 and 6 lb./ac. were applied at seeding. TCA, and to a lesser extent CDAA, caused severe leaf crinkling and reduced sunflower-seed yields. CIPC at 4 lb./ac. caused no injury and gave fair weed control. TCA killed only *Setaria viridis*, CDAA controlled all the weeds present except *Cardaria* sp.—From *Weed Abstr.* 6 : 497.— M.P.

RAPE

See also Abs. 862

754 Hirai, K. and Tamai, M. **Studies on the boron deficiency in field crops. 1. Boron-deficiency symptoms in rape plants.** *Soil Pl. Fd* 1957, **2**, No. 4, 201–3, bibl. 7. [Kyushu Univ., Japan]

The morphological and anatomical symptoms of B deficiency in *Brassica napus*, and the B contents associated with these symptoms were investigated. —D.B.

755 Juvin, P. Contribution à la mise au point d'une méthode de lutte contre la Cécidomyie des siliques du colza (*Dasyneura brassicae* Winn). [**A contribution to the control of brassica pod midge (*D. brassicae*) on colza.**] *C.R. Acad. Agric. Fr.* 1957, **43**, No. 14, 738–42.

In plot trials in 1956–7, parathion and methyl-parathion, each applied at the rate of 600 g. active substance per ha., gave control (90–100% mortality) of the larvae of the brassica pod midge on colza [*Brassica napus* var. *oleifera*]. Diazinon, endothion and 4 753, all tested for one year only, also gave good results. One application of the insecticide at the end of flowering is often sufficient, but 2 applications are required if the infestation is serious.—E.B.O.

756 Torssell, B. Mikroklimatiska studier i höstoljeväxtodlingar. [**Microclimate stu-**

dies on winter oil-seed crops] *Nord. Jordbr-Forskn.* 1956, **38**, 3–4, 316–20.

In trials at Ultuna in 1954–5, winter rape [*Brassica napus* var. *oleifera* subvar. *biennis*] and winter turnip rape [*B. campestris* var. *oleifera* subvar. *biennis*] were sown on 10 July and 4 and 24 Aug. In winter rape sown on these dates, the height of the shoot apex averaged 10, 5 and 0 cm. above ground level, respectively ; with winter turnip rape, the apex was at ground level in all cases during the period of observations. Air temperatures at the apices of winter rape were 5°C. lower than those at the apices of winter turnip rape for the 10 July and 4 Aug. sowings ; in crops sown on 28 Aug., differences were negligible. In further trials, observations were made on temperatures lethal to the growing point. Only in December were lethal temperatures noted, when a temperature of −18·3°C. at 0800 hr. on 4 Dec. was measured by thermometers in contact with the stems of winter rape plants ; on winter turnip rape stems, the temperature at the same time was −7·3°C. A combination of thin snow layer with low air temperatures appeared to be responsible for the critical nature of this December period for the survival of winter rape. In these trials, winter turnip rape, unlike winter rape, survived well.—P.J.B.

LALLEMANTIA IBERICA

757 AGRICULTURA. MADRID. Oleaginosas anuales: la melisa de Moldavia. [**Annual oil plants: *Lallemantia iberica.***] *Agricultura, Madr.* 1957, **26**, No. 306, 528.

Information is given on *Lallemantia iberica* which has a vegetative period of 4 months. In trials near Madrid it yielded 600–1150 kg. of seed (20–30% oil) per ha.—E.B.O.

POPPY

758 VAN ROON, E. Blauwmaanzaadonderzoek in 1955. [**Poppy-seed trials, 1955.**] *Gesten. Meded. 2 Cent. Inst. Landbouwk. Onderz., Wageningen* 1956, pp. 66.

Serious deterioration in the yield and quality of the poppy seed grown in the Netherlands from 1945 onwards has led to a 3-year programme of research by 4 scientific institutes. This report summarizes under 3 heads work done by the Central Institute of Agricultural Research in 1955. (1) Cultural methods. The use of N greatly improved seed production, although differences in response were evident according to soil type and the variety grown. All 3 varieties tested (Nobel, Emsplitting of mabloem and Noordster) reacted favourably to a the N doses, 500 kg. per ha. given in 2 applications producing a higher seed yield than 750 kg. per ha. in one application on sowing. In an experiment, hilling the plants approximately 14 days before flowering affected yield favourably, although in no case was there any lodging. The optimal sowing rate determined was such as to give 10–12 (Noordster 15–17) plants per m. or 30–35 (Noordster 45–50) plants per sq. m. Of the 3 drill widths tested, i.e. 20, 30 and 40 cm., the best results were from 40 cm. It was found advisable to hill up the wider drills. Seed disinfection with mercury increased yield by an average of 5% ; disinfection with 5 g. TMTD per kg. seed increased yield by an average of 29% and with 10 g. TMTD by 23%. Disinfection was especially valuable in one seed sample of inferior quality, the use of 5 g. TMTD per kg. seed producing a yield increase of about 80%. Germination capacity also was improved through disinfection. According to these trials, sowing after 14 April results in reduced yield. (2) Poppy-seed growing on farms in 1955, and adulteration of this crop by *Erysimum cheiranthoides*. Data have been accumulated on : area (1996 ha.) ; varieties grown (Emmabloem in 60% of the area, then Nobel, Noordster of increasingly little importance) ; place in the cropping system (generally preceded by grain crops, to a smaller extent by potatoes and beet) ; sowing date (end - March – early April) ; seed disinfection (disregarded by 33% of the growers) ; sowing rate (varies greatly, ranging from 1 to 10 kg. per ha.) ; drill width (average six holes in a 2-metre drill, extremes 22 and 35 cm.) ; percentage plants obtained (from 15 to 90%, average 47%) ; application of N (in most cases too heavy, and generally in one dressing only) ; thinning (generally by hand, but the trial of a mechanical beet-thinner on 38 farms gave promising results) ; harvesting (generally with a self-binder, but on 11 of 44 plots with a combine) ; yield and quality (approximately 1300 kg. per ha., average quality good). An increasing amount of adulteration by the bitter-tasting seed of *E. cheiranthoides* has greatly reduced the value of Netherlands-grown poppy-seed. A limited degree of purity can be achieved by sieving, but intensive measures of weed control remain necessary. (3) The quality of poppy-seed in relation to the size of the head in Emmabloem. The effect of plant density upon the number of heads formed, their size, content, and relative degree of filling was studied in the variety Emmabloem. The closer the stand, the smaller the number of lateral branches ; if there are more than 25–30 plants per m. not more than one head per plant can develop. Close planting results, however, in a larger number of smaller seeds per head. Since the larger the seed the greater its export value, large seeds are a desirable character. In Emmabloem, good, large seed is obtainable by growing as few plants per unit area as possible. The round type of head has relatively more seed than the pear-shaped and grows to larger size.—G.M.R.

GENERAL

759 Svechnikova, I. N. Les transformations de l'amidon dans les tissus des oléagineux. [**The transformations of starch in the tissues of oil plants.**] *Oléagineux* 1957, **12**, No. 12, 735–40, bibl. 19, illus. [Inst. Pl. Physiol., Moscow, USSR]

Seeds of mustard (*Sinapis alba* and *Brassica juncea*), flax (*Linum usitatissimum*), colza (*B. napus*) and poppy (*Papaver somniferum*) were examined daily from the beginning of flowering to ripening. It is concluded that, in the plants studied, starch accumulates in great quantity in the tissues near the embryo, and that it changes to dextrin which passes into the embryo. Oil is then formed from the dextrin. Ordinary starch grains are the source of dextrin and oil. [See also *Fld Crop Abstr.* 10 : 693.] —E.B.O.

SURVEYS AND LAND USE

SURVEYS

760† FAO. **Report on the 1950 world census of agriculture. Volume 1. Census results by countries.** Rome, 1955, 10s.

The information given, mainly in the tabular form, has been classified under the following headings, amongst others : holding and tenure ; land utilization ; crops ; fertilizers and soil dressings ; irrigation and drainage. The countries considered in this volume are : Alaska ; American Samoa ; Bahamas ; Bermuda ; British Borneo ; British Solomon Islands ; Falkland Islands ; Fiji ; Gambia ; Germany ; Gilbert and Ellice Islands ; Gold Coast and British Togoland ; Guam ; Hawaii ; Jamaica ; Malaya ; Malta and Gozo ; Netherlands ; New Hebrides ; Northern Rhodesia ; Nyasaland ; Philippines ; St. Helena ; Sierra Leone ; Singapore Island ; Tonga; Uganda; Uruguay ; Virgin Islands ; Zanzibar and Pemba. —E.B.O.

761† FAO. **Yearbook of Food and Agricultural Statistics. 1955. Production.** 1956, **9**, Part 1, pp. 427, text in English, French and Spanish.

The information given (mainly in tabular form), on the countries of the world, covers the following subjects, amongst others : land use, irrigation, crops, fertilizers, pesticides and prices.—E.B.O.

762† Ström, E. T. Den turkiska jordbruksproduktionen och dess regionala fördelning. [**Turkish agricultural production and its regional differentiation.** *Svensk Geogr. Årsb.* 1957, **33**, 69–88, bibl. 8, 10 maps, English summary.

The geographical distribution of agricultural production in Turkey is reviewed, with emphasis on the changes that have occurred during 1945–52. —From author's summary. P.J.B.

763 Wilson, T. B. **Sungei Manik padi farm survey. Composition and land tenure, 1956.** *Malay agric. J.* 1957, **40**, No. 2, 92–109, bibl. 3.

Information obtained from completed questionnaires from a systematic sample of rice farmers, provided data on size of holdings, land use, residence, class of land, fragmentation of holdings, consolidation of holdings, size of farms and tenancy. The data are preceded by a history of the Sungei Manik padi-farm area.—D.B.

764† Efremov, S. [**The evaluation of land from an economic point of view.**] [Russian] *Econ. sel'skhoz.* 1957, **28**, No. 8, 60–7. [Minist. Agric., Udmurt ASSR]

The subject is discussed in regard to the different natural/climatic areas in the Udmurt Autonomous Republic. There is information on the areas sown to various field crops and on the proportion of meadows and pastures to arable land. —M.H.

765† Genetica Agraria. Problemi dell'agricoltura in Cina. [**Agricultural problems in China.**] *Genet. agr.* 1957, **7**, No. 3–4, 71–362, illus.

This special number of the journal consists of reports by members of an Italian agro-biological mission to China in 1956. Information is given on the following subjects, amongst others : agricultural zones, land utilization, crops [for rice cultivation see Abs. 550], agrarian reforms, co-operation, crop protection, teaching and research [see Abs. 892].—E.B.O.

766† Chouard, P. Le centre de recherches sahariennes de Beni-Abbès et les recherches biologiques et agronomiques au Sahara. [**The Sahara research centre, Beni-Abbès ; biological and agronomic research in the Sahara.**] *C.R. Acad. Agric. Fr.* 1957, **43**, No. 9, 477–88.

Information is given on : the Station at Beni-Abbès and the Beni-Abbès region which is representative of the Sahara, the natural environments of the Sahara, and in particular its vegetation and agriculture.—E.B.O.

767† Volosky, Y. E. Realidad actual y posibilidades agrícolas de Isla de Pascua. [**Present situation and agricultural possibilities of Easter Island.**] *Agric. téc., Santiago* 1956, **16**, No. 1, 47–60, bibl. 7, illus., English summary.

Information is given on the climate, vegetation and crops of Easter Island. The climate is subtropical and maize is the principal crop.—E.B.O.

LAND USE

See also Abs. 866

768† Cole, Monica M. **Land use studies in the Transvaal Lowveld.** *Occ. Pap. 1 World Ld Use Serv.* 1956, pp. 41, bibl. 51, illus., maps, London: Geog. Pub. [Received Oct., 1957]

The area of the South African Lowveld studied occupies the eastern portion of the Transvaal and Swaziland and lies less than 3000 ft. a.s.l. Detailed investigation was confined to the Transvaal, in particular to the Crocodile–Komati drainage basin. A picture of the existing land use in the area is presented and those aspects of the physical environment felt to be of fundamental importance in any agricultural development in the region are discussed.—M.P.

769† Department of Soil and Land-use Survey, Ghana. **Report for the period 5th June, 1951 to 31st December, 1955.** *Rep. Dep. Soil Land-Use Surv., Ghana* 1957, pp. 28, bibl. 14, 2 maps, 2s. 6d.

Results of soil surveys in the forest and savannah zones of Ghana are outlined, and brief mention is made of the actual or possible land use in the areas covered. A preliminary map and survey of the major grass associations of the country have been made. Also under preparation was a provisional land-use map of the country on a scale of 1 : 500,000. A reference museum has been established containing specimens of soil profiles, rocks and plants (mainly grasses and sedges).—M.P.

770† Brown, L. H. **Development and farm planning in the African areas of Kenya.** *E. Afr. agric. J.* 1957, **23,** No. 2, 67–73.

LAND RECLAMATION

771† Tasker, J. **Restoration of opencast coal land.** *Agriculture* 1957, **64,** No. 7, 329–32.

This article, based on experience in the West Riding of Yorkshire, is concerned mainly with the physical restoration of the top soil, both from the aspect of its mechanical state and the build-up of fertility. The stage under review is that between the contractors completing the restoration of the site and its being considered satisfactory for handing back to the farmer.—D.B.

FARMING SYSTEMS AND PRACTICES

772† Guillard, J. **The rural modernisation sub-district in the Toupouri Country of northern Cameroons.** *Sols afr.* [n.d.], **4,** No. 2, 30–63, illus., text in English and French. [Sous-Sect. Modern. Rurale, Toupouri Country, French Cameroons]

In conjunction with the creation of a network of forest strips, a rudimentary unit for providing the native settlements with technical assistance and leadership was established at Golonpoui in Toupouri Country, a thickly populated area, in 1954. Its object is to improve the agricultural production and raise the standard of living of the rural population. The climate is Sahelo-Sudanese with an average yearly rainfall of slightly less than 900 mm. (4 very rainy months and 6 dry months). The soils are generally poor and sandy. Information is given on the agriculture of the region. Sorghum, the staple crop, is grown on 75% of the cultivated area ; other crops grown are groundnuts, *Voandzeia* sp., cassava and cotton. The programme adopted was : (a) to persuade the peasants of the possibility and advantage of improving their techniques ; (b) to enable them to use animals for draught, to acquire fertilizers and improved seeds ; (c) to bring them to adopt a rational organization of farming. The methods tested at Golonpoui were applied in 1955 to 3 neighbouring villages, and later to other villages so that a total area of 12,000 ha. (5120 inhabitants) was covered. An account is given of results achieved. The use of draught animals was successful. An average increase of 10% in sorghum yield was achieved by treating the seed for blight control. Land survey showed that only a 2-yr. fallow was possible following a crop of groundnuts and one of white, rainy-season sorghum.—E.B.O.

773 Schlippé, P. de. Enquête préliminaire du système agricole des Barundi de la région Bututsi (Ruanda-Urundi). [**Preliminary investigation into the farming system of the Barundi of the Bututsi region (Ruanda-Urundi).**] *Bull. agric. Congo belge* 1957, **48,** No. 4, 827–82, bibl. 11, illus.

774 Department of Agriculture, and University of Saskatchewan. Canada. **Guide to farm practice in Saskatchewan, 1957.** *Publ. Dep. Agric., Univ. Saskatch.* 1957, pp. 192, illus.

Included in this publication is a list of the cereal and flax varieties recommended for the various zones of Saskatchewan.—M.P.

775† Tondeur, G. and Bergeroo-Campagne, B. L'agriculture nomade. Volume 1 : Congo belge–Côte d'Ivoire. [**Shifting cultivation. Vol. 1 : Belgian Congo–Ivory Coast.**] *Cah. 9 F.A.O.* 1956, pp. 230, bibl. 12, illus.

This is the first volume of a series of studies on shifting cultivation as practised in tropical countries. Although the number of people throughout the world engaged in this type of cultivation is relatively small, the total area over which it is practised, although difficult to determine, is very

considerable. The number of people engaged in shifting cultivation, which is always accompanied by burning, appears to be increasing with the result that the duration of the resting periods is often reduced, the danger from soil deterioration increased and forest regrowth after cultivation possibly prevented. The problem of shifting cultivation is complex as it has agricultural, forestry, physical, political, economical and social aspects. The first study by G. Tondeur is concerned with the Belgian Congo. This is said to be the only country where a general policy has been laid down to deal with the problem of shifting cultivation. Before the Europeans' arrival this form of agriculture covered the whole territory, with the exception of the Ruanda Urundi and certain areas of the Kivu and Ituri. This situation has remained practically unchanged. The factors which justify shifting cultivation are examined, emphasis being placed on the ecological ones. The conclusion is drawn that shifting cultivation should eventually be replaced by an intensive agriculture, but that it is not yet time for this change. In the meantime, shifting cultivation, which provides the annual food crops, should be maintained but its methods improved. Three different examples of improvement (at Bambesa, Yangambi and in the Ruzizi plain) are described. The development of perennial crops is a separate programme. The second work, by B. Bergeroo-Campagne, is a detailed study of a small area (10,000 ha.) in the Ivory Coast inhabited by the N'Dranoua tribe. The principal aspects examined are : factors determining shifting cultivation (physical, economical; social and legal factors are considered and phytosociological data are given) ; farming systems and crops ; grazing ; harmful consequences of shifting cultivation and possibilities of its evolution; measures taken to suppress, or regulate it. Among the measures suggested are : suppression of fires in rested areas ; pasture management ; establishment of irrigated rice-fields ; limitation, or prohibition, of the growing of certain crops ; trials to establish a permanent, intensive agriculture.—E.B.O.

776† Guilloteau, J. **The problem of bush fires and burns in land development and soil conservation in Africa south of the Sahara. (1 : Current ideas—Effect of fire on African vegetation).** *Sols afr.* [n.d.], **4,** No. 2, 54–102, bibl. 49, illus., text in English and French. [Inter-African Bur. Soils and Rural Econ.]

In this first part of the study the position is reviewed under the following heads : (A) present positions with regard to bush fires ; (B) effects of bush fires on vegetation, (i) destruction of vegetation and humus, (ii) evolution and modification of the vegetation under the influence of fire, (iii) fire and pasture management. It is concluded that burning profoundly modifies the flora, and that these modifications may be disastrous, or profitable, depending on the type of vegetation affected, the topography, the nature of the soil and its moisture content, as well as the time of the year and the intensity and frequency of burning.—E.B.O.

777† Commission for Technical Co-operation in Africa South of the Sahara. **Effects of fire on soils and vegetation.** *Mon. bibl. Bull. B.I.S.* 1957, **7,** No. 6/7, 5–23, bibl. 66.

778† Baird, G. B. and others. *Crotalaria juncea*—un abono verde. [*C. juncea*, **a green manure (in Colombia).**] *Bol. Divulg. 2 Minist. Agric. Colombia* 1957, pp. 23, bibl. 11, illus.

779† Hernández, A. A. Abonos verdes. Anotaciones sobre leguminosas cultivadas en el Tolima. [**Green manures. Notes on legumes grown in Tolima (Colombia).**] *Agric. trop., Bogotá* 1957, **13,** No. 9, 561–76, bibl. 11, illus. [Inst. Pil. Educ. Fund., Pamplona, Colombia]

As a result of more than 8 years of studying the growing of green manures in rotation with the principal crops of the region, such as cotton, maize and sesame (*Sesamum indicum*), the following green-manure plants are particularly recommended : *Crotalaria juncea*, the shrubby varieties of cowpea (*Vigna sinensis*) and some soyabean varieties (mainly Yellow Mammoth).—E.B.O.

780 Geizsler, G. N. **Crop yields are affected by tillage practices.** *Bi-mon. Bull. N. Dak. agric. Exp. Sta.* 1957, **19,** No. 6, 3–8, bibl. 7.

The long-term results of tillage experiments at 6 experiment stations in North Dakota are presented. Ploughing stubbles in spring resulted in higher cereal yields than ploughing stubbles in autumn in the western two-thirds of the State, except in years of above-average rainfall ; the reverse was true of the eastern third. Ploughing stubble-land for seed-bed preparation resulted in higher wheat yields than sub-surface and surface tillage practices. The yields of cereals on disced maize-stubble were equal to those on ploughed maize-stubble except under weedy conditions, or where heavy plant residues remained. For summer-fallow, stubble-mulch tillage was as satisfactory as mouldboard ploughing. Yield differences in favour of fallow were greatest in low-rainfall years and least under favourable rainfall.—J.F.C.

781† Simon, W. and others. Vorläufiger Bericht über Beziehungen zwischen Wurzelmenge und Vorfruchtwert bei verschiedenen Klee- und Grasarten als Hauptfrucht auf leichten Böden. [**Preliminary report on the relationship between quantity of roots and the value as a preceding crop of several leguminous and grass species when grown as a main crop on light soils.**] *Z. Acker- u. PflBau* 1957, **104,** No. 1,

71–88, bibl. 4, illus. [Inst. Acker- u. PflBau Müncheberg (Mark), E. Germany]

The relationships between the weight of roots and tops, and between root weight and the yield of the following crops in the rotation (1st, potatoes ; 2nd, winter-rye or oats) were studied with the aid of root samples taken from a depth of 0–35 cm. and 35–70 cm. In leguminous crops, there was a positive correlation between root mass, yield of tops and the yield of the first following crop. In grasses, there was no clear relationship between these functions. Legume roots produced a stron initial, but not a lasting, effect on the yield of th following crops ; grass roots produced an observ able beneficial result only after 2 years. N-enrich ment of the soil had a stronger effect on th following crop than had improvement of soil struc ture. These grasses had a good preceding-cro value for the dry, sandy soils of Müncheber (Mark) : *Festuca pratensis*, *Lolium perenne* and *L multiflorum*. Of the legumes the best were *Medicag sativa*, *Trifolium repens* and *Onobrychis sativa*.—D.B.

SOIL AND WATER CONSERVATION

See also Abs. 860

782† U.S. Department of Agriculture. Soil Conservation Service. **A manual on conservation of soil and water.** *Agric. Hdbk 61, U.S. Dep. Agric. Soil Conserv. Serv.* 1954, pp. 208, illus., 60 cents. [Received April, 1957]

This handbook sets out to explain the major causes and consequences of soil erosion and to outline, in some detail, practices and recommendations designed to reduce or prevent it. The information given is based largely on the experience and technical publications of the Soil Conservation Service of the U.S. Department of Agriculture, and is divided into the following main sections : classifying land capability, preventing and controlling gullies, terracing, strip-cropping, the improvement of pastures and rangelands, conservation irrigation, farm drainage and conservation nurseries.—P.J.B.

783† Sirur, S. S. **Problems of dry farming and soil conservation in New Mysore State.** *Mysore agric. J.* 1957, **32,** No. 2, 89–94, bibl. 3. [Mysore State Dep. Agric.]

784† Jung, L. Ertragssicherheit in erosionsgefährdeten Hanglagen. [**Ensuring yields on slopes liable to erosion.**] *Z. Acker- u. PflBau* 1957, **104,** No. 2, 181–8, bibl. 21.

Soil erosion as a cause of seasonal fluctuations in crop yields, especially on sloping land, is examined. Preventive measures are suggested.—D.B.

785† Hudson, N. W. **Erosion control research. Progress report on experiments at Henderson Research Station, 1953-1956.** *Rhod. agric. J.* 1957, **54,** No. 4, 297–323, bibl. 6, illus.

A series of experiments has been laid down to determine the importance of erosion factors in Southern Rhodesia and the measures needed to counteract or minimize them. Results to date stress the value of a good ground cover. The action rain-drop impact and splash was shown to b very important. In 3 years a bare fallow lost 34 tons of soil/ac., a mosquito-gauze-covered plot lo 2·9 tons/ac., and a grass-covered plot 3·3 tons/a Contour ridges greater than 90 ft. apart resulte in an increase in soil loss ; contour-spacing did n markedly affect run-off. Sunnhemp was shown t be a poor green-manure and cover-crop for reduc ing erosion. [See also *Fld Crop Abstr.* 9 : 103 10 : 794 and 1149.]—M.P.

786† Rensburg, H. J. van. **Erosion control an gully utilization.** *J. Brit. Grassl. Soc.* 195 **12,** No. 4, 278–9, bibl. 2. [Vet. Res. Sta., Mpwapwa Tanganyika]

The generally held theory that the clima vegetation affords the best protection against gull erosion was disproved in the deciduous thicket are of Central Tanganyika. On the other hand, th grasses *Cynodon plectostachyus* and *Pennisetum pu pureum* can readily be established and provid ground cover. *C. plectostachyus* is the better one use in steep and narrow gullies. It spreads an holds back soil particles and moisture, thus form ing a fertile gully floor. During 2 years, silt to depth of 13·5 in. accumulated under *C. plect stachyus* and 11 in. under *P. purpureum*.—D.B.

787 Tanaka, S. **Studies of the shelter hedg for the control of wind erosion. Preventive function of the twigs hedg** [Japanese] *J. Kanto-Tosan Agric. Exp. Sta.* 195 No. 10, 80–106, bibl. 19, illus., English summar

This is a mathematical study of the relatio ship between wind velocity and type, length an height of windbreak.—D.B.

788† Daniel, H. A. and others. **Design of plo conforming to the land for evaluatin moisture conservation practices.** *Proc. Soil S Soc. Amer.* 1957, **21,** No. 3, 347–50, bibl. 5. [Whea land Conserv. Exp. Sta., Cherokee, Okla]

WEEDS AND WEED CONTROL

Where weeds are specific to a crop, see under the crop concerned. See also Abs. 868.

789 Evans, S. A. **Couch and its control.** *Agriculture, Lond.* 1957, **64**, No. 6, 298–301, bibl. 3. [A.R.C. Unit. Exp. Agron., Oxford]

The weed species considered are *Agropyron repens*, *Agrostis* spp. and *Arrhenatherum elatius*.—M.P.

790 Sikka, S. M. and Mani, U. S. ***Argemone mexicana* and its eradication.** *Indian Oilseeds J.* 1957, **1**, No. 4, 252–5, illus. [Indian Agric. Res. Inst., New Delhi]

A. mexicana infests fields of oil crops and wheat in N. India and of *Sorghum vulgare* in S. India. It has spread to roadsides and waste places and is poisonous to cattle and man. Measures for control are: hot-weather cultivation, weeding before flowering, rotation of crops, chemical control (not for oilseed crops) and legislation.—D.B.

791 Bruns, V. F. and Wolfe, H. H. **Ditchbank weed control in Washington.** *Ext. Bull. 521 Washington agric. Exp. Sta.* 1957, pp. 14, illus.

Practical recommendations are given for the control of 24 common ditch-bank weed species.—P.J.B.

792† Lea, J. D. **The effect of ring-barking and 2,4,5-T applied as a bark paint on *Acacia seyal* Del.** *E. Afr. agric. J.* 1957, **23**, No. 2, 89–90. [Res. Div., Sudan Minist. Agric., Cent. Rainlands Res. Sta., Tozi]

In the 25–35-in. rainfall zone of the Sudan clay plain, ring barking gave 83–90% control of *Acacia seyal*, whereas painting the ring of bark with a 2% solution of 2,4,5-T gave only 11% control.—M.P.

793† Renard, L. and Lawalrée, A. Une nouvelle graminée adventice, *Eremopyrum buonapartis*. [***E. buonapartis*, a new grass weed (in Belgium).**] *Bull. Soc. Bot. Belg.* 1957, **89**, 108–9.

794† Lambinon, J. Contribution à l'étude de la flore adventice de la Belgique. 1. Adventices rares ou nouvelles pour la Belgique. [**A contribution to the study of the adventitious flora of Belgium. 1. Rare, or new, weeds in Belgium.**] *Bull. Soc. Bot. Belg.* 1957, **89**, 85–100, bibl. 23.

An annotated list is given of 30 rare, or new, weeds in Belgium.—E.B.O.

795 Mikula, B. C. **Variations in *Sorghum vulgare* var. *drummondii* (Steud.) Chiov.** *Diss. Abstr.* 1957, **17**, No. 1, 23–4. [Washington Univ., Seattle]

A study was made of the distribution and variation in weed sorghums in the USA. Two variation complexes were distinguished, one with affinities to broom corn and the other to the syrup sorghums.—P.J.B.

796 Cumming, B. G. and Frankton, C. **Response of some North American species of the genus *Chenopodium* (Tourn.) L. to daylength.** *Res. Rep. Nat. Weed Cttee [Canada]* 1957, 95–6. [Bot. and Pl. Pathol. Div., Sci. Serv., Canada Dep. Agric., Ottawa]

Observations are given on the flowering response of plants grown from seed samples of some *Chenopodium* spp. collected from different localities in N. America, germinated and grown under short and long day-lengths of 6 and 8 and of 16 and 24 hr., respectively.—P.J.B.

797† Harker, K. W. **A note on *Digitaria scalarum* seed.** *E. Afr. agric. J.* 1957, **23**, No. 2, 109. [Anim. Health Res. Cent., Entebbe, Uganda]

Evidence is presented that seed of *D. scalarum* could be an important factor in the propagation of this serious weed.—M.P.

798† Harper, J. L. **Ecological aspects of weed control.** *Outlook on Agric.* 1957, **1**, No. 5, 197–205, bibl. 44.

799 Zeiler, E. H. Voorlopig verslag van een onderzoek naar het verband tussen zuurgraad en onkruidbegroeiing in de Wageningse Eng. [**Preliminary report on a study of the relation of pH to weed growth at Wageningen.**] *C.I.L.O. Stencil 2579 and 2580* [n.d.], pp. 6, bibl. 4, mimeo. [Received 1957]

800† Kommedahl, T. and others. **The toxic effect of quackgrass on growth of alfalfa.** [Abstract] *Phytopathology* 1957, **47**, No. 9, 526.

In field tests, both stands and dry weights per plant of lucerne were half as great when lucerne was grown in soil previously occupied by *Agropyron repens*, as when sown in soil free from *A. repens*. In the greenhouse, the addition to the soil of dried, ground rhizomes of *A. repens* resulted in severe stunting and chlorosis of lucerne seedlings, a reduction in seedling stands and a delay in germination. The green weight of lucerne grown on soil to which ground rhizomes, or water extracts of rhizomes had been added, was 20 and 75%, respectively, of that of plants grown on untreated soil. Autoclaving of either soil or rhizomes did not appreciably alter these results.—Extract. P.J.B.

801 Nilsson, B. Missbildning av ogräsfrö efter besprutning. [**Deformity of weed seeds after spraying.**] *Medd. Frökontrollanst., Stockh.* 1957, No. 32, 55–7, illus., English summary.

Droplet-shaped seeds in samples received at the Seed Testing Station at Stockholm were found to be deformed seeds of *Stellaria media*. These de-

formities had been caused by spraying with mixtures of 9 l. agroxon + 3 l. 2·4 DL [containing 250 g. a.e. of 2,4-D triethanolamine salt per l.] per ha. Thousand-grain weight of the deformed seed was 0·6 g., the same as that of normal seed. The chromosome number of the deformed seed was normal for *S. media* and such seed produced plants which were nearly normal.—J.K.L.

802 Feekes, F. H. and Reitsma, J. Enkele proeven met CIPC als selectief onkruidbestrijdingsmiddel alsmede enige beschouwingen over CIPC in vergelijking met IPC (propham). **Some experiments with CIPC as a selective weedkiller together with a discussion on CIPC as compared with IPC (propham).** *Meded. LandbHogesch., Gent* 1957, **22,** No. 3, 592–612, bibl. 43, illus., English summary. [N.V. Fabr. Chem. Prod. Vondelingenplaat, Netherlands]

Both herbicides inhibit root growth. Propham acted more specifically against grasses than did CIPC. Propham was more suitable for controlling weeds in deep-rooted crops, CIPC for weeds in shallow-rooted crops, e.g. bulbs, tubers and transplanted crops. CIPC was most effective where the crops had not passed the cotyledon stage.—From authors' summary. R.B.

803† Huffaker, C. B. **Fundamentals of biological control of weeds.** *Hilgardia* 1957, **27,** No. 3, 101–57, bibl. 177, illus.

The role of insects in the biological control of weeds is discussed.—R.B.

804† New Zealand Weed Control Conference. **Proceedings of the 10th Conference, Napier, 1957.** Pp. 115.

The following were among the papers read : Control of kikuyu grass [*Pennisetum clandestinum*] by C. M. Blick ; The effect of weedkillers on seed germination, by Suzanne C. Harrison ; Weed control in peas, by F. B. Thompson ; Brassica weed control, by S. N. Dawes. [See also *Fld Crop Abstr.* 10 : 1618.]—M.H.

805 North Central Weed Control Conference. **13th Annual Research Report 1956.** [n.d.], pp. 189. [Received April, 1957]

Abstracts presented included :

1. Canada thistle (*Cirsium arvense*) and perennial sowthistle (*Sonchus arvensis*), [11 abstracts]. By B. J. Rogers (summarizer), pp. 1–7. Results from the use of herbicides and soil sterilants for the control of these weeds in arable land, grassland and fallow are outlined. Amino triazole was reported, in the majority of cases, to give good control, application 1–2 weeks prior to the bud stage being most satisfactory. At the rates used, the soil sterilants erbon, concentrated borascu and sodium chlorate gave good control for at least 1 yr.—From summary.

2. Field bindweed, [4 abstracts]. By W. M. Phillips (summarizer), pp. 8–10. Experiments conducted under both dryland and irrigated conditions are reported. Benzoic-acid materials were outstanding, and control of *Convolvulus arvensis* ranged from 80–100%.

3. Bur ragweed, [2 abstracts]. By P. F. Sand, pp. 11–12. *Franseria tomentosa* was successfully controlled by June-applications of 1–2 lb. 2,4-D/ac., and amino triazole at 2–4 lb./ac.—From summary.

4. Leafy spurge, [4 abstracts], pp. 14–20 ; Russian knapweed, [3 abstracts], pp. 20–1. Results are reported from the use of amino triazole, 2,4-D, 2,4,5-T, 2,4,5-TP, DB granular, and 2,3,6-TBA, and the soil sterilants erbon, ureabor and chloreabor, for the control of *Euphorbia esula* and *Centaurea repens*.

5. Control of Bermudagrass [*Cynodon dactylon*] with TCA and dalapon in combination with cultivation. By W. C. Elder, pp. 33–4. Ploughing 10 days after treatment with 10 lb. dalapon/ac. left only a trace of *C. dactylon* and was the best of the control measures compared.

6. Johnson grass, [6 abstracts], pp. 33–6. Dalapon was superior to TCA for the control of *Sorghum halepense*. Satisfactory results were obtained, in the year of treatment, with 10 lb. dalapon/ac. in either single or split applications. Control in the year after treatment was less satisfactory.—From summary.

7. Control of quackgrass with dalapon. By R. R. Yeo and others, pp. 44–5. Complete eradication of *Agropyron repens* resulted from autumn-application of 20 lb. dalapon/ac. Lower rates were less satisfactory, and spring treatments resulted in temporary control only.

8. Annual, winter-annual and biennial broad-leaved weeds, [2 abstracts], pp. 63–4. *Kochia scoparia* in cropland was successfully controlled by MCPA amine and amino triazole (each at 1–5lb./ac.), 2,4-D, CDT and polychlorobenzoic acid (each at 1 lb./ac.). 100% control of *Spergula arvensis* in fallows was obtained with CMU (1·5 lb.), CDT (4 lb.) and polychlorobenzoic acid (6 lb./ac.).

9. Effectiveness of several chemicals for controlling annual weeds in irrigation ditches. By L. A. Derscheid, p. 189. Results indicated that ureabor (dry) or chlorea (spray) may be useful for sterilizing the banks of irrigation ditches, and amino triazole + 2,4-D for controlling broad-leaved weeds.—M.P.

CROP BOTANY

PHYSIOLOGY

806 Wiersum, L. K. **The relationship of the size and structural rigidity of pores to their penetration by roots.** *Plant and Soil* 1957, **9**, No. 1, 75–85, bibl. 14, illus. [Inst. Soil Fert., Groningen, Netherlands]

The studies reported were made to evaluate the ability of the roots of a number of grass and field-crop species to penetrate pores of different sizes in sintered glass filter discs and sand columns and to determine the effect of rigidity of pore structure on root penetration. The results showed that roots were able to penetrate pores only when the pore diameter exceeded that of the young root. In studies in which seedlings of *Brassica rapa* and *Avena sativa* were grown in columns of sand contained in cylinders of diameters ranging from 5 to 20 mm., roots could penetrate to considerable depths in wide tubes, but were restricted in narrow tubes, owing to the reduced mobility of the sand particles.—P.J.B.

807 Watson, D. J. **The dependence of net assimilation rate on leaf-area index.** *Ann. Bot., Lond.* 1958, **22**, No. 85, 37–54, bibl. 7. [Rothamsted Exp. Sta., Harpenden, Herts]

The leaf-area index (leaf area per unit area of land, L) of field crops (kale and sugar-beet) was varied experimentally by removing uniformly through the crop different fractions of the plant population. The net assimilation rate (E) was determined in subsequent periods of 10–14 days. For kale, E decreased nearly linearly with increase of L throughout the range from 1 to 5. E of sugar-beet was less affected by change in L and was apparently not decreased until L rose beyond about 3. Because of this dependence of E on L, the rate of dry-matter production per unit area of land, or crop growth-rate ($C = EL$), showed a curved relation to L ; for kale it increased to a maximum when L was between 3 and 4 and fell again at higher values of L. Maximal C for sugar-beet occurred beyond the range of L tested, probably between $L = 6$ and $L = 9$. This optimal L for dry-matter production by sugar-beet crops probably lies near the upper limit of the current agricultural range, so there is little, if any, scope for increasing the dry-matter yield by further increase in L. For heavy kale crops L is already far in excess of the optimum, and it may be possible to increase the total dry-matter yield of kale by repeated thinning or defoliation to hold L near the optimum.—From author's abstract. M.H.

808† Slatyer, R. O. **The significance of the permanent wilting percentage in studies of plant and soil water relations.** *Bot. Rev.* 1957, **23**, No. 10, 585–636, bibl. 191. [Div. Land Res. and Reg. Surv. CSIRO, Canberra, Australia]

809† Šatilov, I. S. and others. [**Photosynthesis of perennial herbage and winter wheat under negative temperatures.**] [Russian] *Izv. Timirjazevsk. seljsk. Akad.* (*Bull. Timirjazev agric. Acad.*) 1957, No. 3, 207–12, illus.

It is claimed that study of leaf assimilation is facilitated by the use of labelled carbon. Samples of *Trifolium pratense*, *Medicago sativa*, *Phleum pratense* and *Festuca pratensis*, in addition to the winter-wheat variety Moskovskaja 2453 and the wheat/*Agropyron* hybrid No. 599, were used in the experiments described. Specimens were taken from the field and grown in flasks which were placed, together with a small thermometer, under a sealed glass jar supporting a separating funnel containing sulphuric acid. Illumination was determined by means of a luxometer constructed by the Leningrad Agrophysical Institute. Temperatures and illumination were recorded every 30 min. and exposure was for 2–3 hr., from the moment when air temperature within the jar (minimum of −14°C.) became level with that of the open air. In each jar 20 μc. ^{14}C was introduced by means of a suspended test tube containing sodium carbonate. To determine the amount of carbon assimilated in the dark, one variant was covered with a dark cloth. The leaves were ultimately weighed, fixed at 105°C. [fixative not mentioned] and pulverized. The powdered leaves were put in small flasks in a desiccator for 4 or 5 days, each sample then being tested with a Geiger counter. To determine the amount of carbon translocated in organic form, the powdered leaves were treated with 10% HCl, dried off in the desiccator and the quantity of ^{14}C estimated by the number of counts. The data show that : (1) intensity of assimilating CO_2 by different plants is not uniform (in timothy leaves the content of ^{14}C is 3 times greater than in clover leaves and almost 70 times greater than in winter wheat) ; (2) of the plants tested lucerne and timothy show the most intense CO_2-synthesizing activity at low temperatures (−11°C.) ; (3) at low temperatures in the dark, absorption of CO_2 is insignificant ; (4) the intensity of photosynthesis at negative temperatures is greater in lucerne (254 counts) than in red clover (66 counts). The value of this method for studying photosynthesis when determining the winter hardiness of crops is recorded.—M.H.

GROWTH AND REPRODUCTION

See also Abs. 876

810 Sen Gupta, J. C. **13. The physiology of growth and development of some crop plants.** *Bull. bot. Soc. Beng.* 1955 (issued 1956), **9**,

No. 1, 62–80, bibl. 23. [Presidency Coll., Calcutta] [Seen Jan., 1958]

An account is given of trials to study the effect of environmental factors (different seasons of the year) ; vernalization at low and high temperature ; and, particularly, photoperiods, on various crops, including fibre crops (*Corchorus* sp., *Hibiscus sabdariffa*, *H. cannabinus*, *Crotalaria juncea* and *Linum usitatissimum*), mustard, groundnuts, *Sesamum* sp., pulses and *Sorghum roxburghii* var. *hians*.—E.B.O.

811 Cooper, J. P. **Developmental analysis of population in the cereals and herbage grasses. 2. Response to low-temperature vernalization.** *J. agric. Sci.* 1957, **49**, Pt 3, 361–83, bibl. 34, illus. [Welsh Pl. Breed Sta., Univ. Coll. Wales, Aberystwyth]

A range of populations of cereals and herbage grasses, mainly of *Lolium*, *Phleum* and *Triticum*, was tested in the greenhouse for response to low-temperature vernalization. Leaf number before heading was used as the measure of reproductive development. A close correlation was found between the climatic or agronomic origin of each population and its response to low temperature. In the cereals, response to low temperature was found in 1 ecological group only, namely, the winter wheats from western Europe. Short-lived annual grasses tested showed little or no response to low temperature. Variations in sowing date produced only slight differences in the leaf number, the interaction between strain and sowing date is small, and good discrimination between population samples is possible. It is important to keep the greenhouse temperature between 50° and 70°F. to avoid natural vernalization or devernalization of material. The use of probit diagrams for comparing truncated distributions is discussed. [See also *Fld Crop Abstr.* 9 : 1201.]—From author's summary. M.P.

812 Razumov, V. I. [**Results of researches on the theory of phasic development.**] [Russian] *Agrobiologija* (*Agrobiology*) 1957, No. 5 (107), 89–100, bibl. 47. [All-Union Inst. Pl. Ind. Leningrad]

813† Stanhill, G. **The effect of differences in soil-moisture status on plant growth : a review and analysis of soil moisture regime experiments.** *Soil Sci.* 1957, **84**, No. 3, 205–14, bibl. 80. [Nat. Veg. Res. Sta., Wellesbourne, War]

The results from 80 papers dealing with soil-moisture regime experiments were compared. Results from 66 showed that plant growth responded to differences in soil-moisture regime while results from 14 showed no significant response. The ratio of positive to negative results was significantly greater in experiments with annuals than with perennials and when vegetative growth rather than reproductive growth was measured.—R.B.

GROWTH SUBSTANCES

814 Fang, S. C. and Butts, J. S. **Studies of carboxyl - ^{14}C - labelled 3-indoleacetic acid in plants.** *Pl. Physiol.* 1957, **32**, No. 4, 253–9, bibl. 11, illus. [Oregon Agric. Exp. Sta., Corvallis]

Studies, using bean and maize plants, are reported on the absorption and translocation of IAA and on the effect of light and 2,4-D on its destruction in the plant.—P.J.B.

815 Vlitos, A. J. and Meudt, W. **The effect of light and of the shoot apex on the action of gibberellic acid.** *Contr. Boyce Thompson Inst.* 1957, **19**, No. 1, 55–62, bibl. 9.

Gibberellic acid overcame the inhibiting effect of red, blue, or green light on stem elongation of Alaska pea seedlings. It was concluded that the elongation response in pea seedlings was due not only to gibberellic acid, but also to growth factors produced in the shoot apex.—From authors' summary. P.J.B.

816† Čaĭlahjan, M. H. [**Chemical stimulants of growth and flowering in plants.**] [Russian] *Priroda, Moskva* (*Nature, Moscow*) 1958, **47**, No. 1, 99–102, bibl. in text, illus. [Timirjazev Inst. Pl. Physiol., Moscow]

A short history is given of researches on growth stimulators, including gibberellic acid.—M.H.

817† Brian, P. W. and Hemming, H. G. **The effect of maleic hydrazide on the growth response of plants to gibberellic acid.** *Ann. appl. Biol.* 1957, **45**, No. 3, 489–97, bibl. 12, illus. [ICI Ltd., Akers Res. Lab., Welwyn, Herts]

818 Moore, T. C. **Effect of gibberellic acid on the growth of pea seedlings when imbibed through the seed coat.** *Nature, Lond.* 1958, **181**, No. 4607, 500, bibl. 1. [Biol. Dep., Univ. Colorado, Boulder]

The effect of gibberellins on the physiological processes in plants has been studied primarily in regard to plant growth and development subsequent to germination [see Stove and Yamaki in *Fld Crop Abstr.* 10 : 1677]. The author demonstrates that gibberellic acid may produce a typical response when imbibed through the seed coat of the dwarf Telephone pea prior to germination.—M.H.

PLANT NUTRITION

See also Abs. 878

819 Warington, Katherine. **The influence of the pH of the nutrient solution and the**

form of iron supply on the counteraction of iron deficiency in peas, soybean and flax by high concentrations of molybdenum. *Ann. appl. Biol.* 1957, **45**, No. 3, 428–47, bibl. 15, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

CHEMICAL ANALYSIS AND COMPOSITION

820 Padhye, V. P. **A rapid method for the determination of calcium and magnesium in plant material by titration with disodium ethylenediaminetetra-acetate.** *Analyst* 1957, **82**, No. 978, 634–8, bibl. 5. [Govt Chemist's Dep., Dar-es-Salaam, Tanganyika]

821† Jones, L. H. and Thurman, D. A. **The determination of aluminium in soil, ash, and plant materials using eriochrome cyanine R.A.** *Plant and Soil* 1957, **9**, No. 2, 131–42, bibl. 12. [Dep. Bot., Univ. Birmingham]

The method of Al determination described is approximately twice as sensitive as the standard "Aluminon" method.—From authors' summary. R.B.

TECHNIQUES AND APPARATUS

See also Abs. 876

822 Stanford, G. and De Ment, J. D. **A method for measuring short-term nutrient absorption by plants : 1. Phosphorus.** *Proc. Soil Sci. Soc. Amer.* 1957, **21**, No. 6, 612–17, bibl. 4, illus.

Plants grown in sand without P developed a mat of roots at the bottom of the container. The exposed root-mat could be placed in contact with an experimental soil-fertilizer system so that P uptake could be measured. Experiments employing this technique were undertaken using oats and a sandy loam fertilized with superphosphate. P uptake increased linearly (a) with time, between 1 and 7 days, (b) with rates of applied P ranging from 0–50 mg. per 200 g. soil. After absorption periods of 3 – 7 days, recovery of applied P ranged from 2 to 5%. Moisture equivalent was approximately the optimum soil-moisture level for P uptake.—From authors' summary. R.B.

823† Najmr, S. Über die Methode der Isolierung der Wurzelsysteme der Futterpflanzen aus dem Boden. [**A method for isolating root systems of fodder plants from the soil.**] *Z. Acker- u. PflBau* 1957, **104**, No. 1, 103–9, illus. [Inst. Pflanzenerzeugung, Ruzyně, Prag, Czechoslovakia]

A brief description is given of a method for obtaining a soil monolith with fodder plants growing *in situ* and of the soil-washing process which leaves the isolated roots undamaged and distributed as in the living plant. The cross section of the monolith, 40 cm. × 40 cm., is suitable for studying roots of fodder plants whether sown in rows or broadcast. A depth of 60 cm. takes in 80% of the root mass of most fodder plants ; and for those having roots which penetrate to the C horizon, a depth of 100 cm. is suitable. By this procedure, which has been used for 5 years on different soils and for roots of many species, it has been possible to make a reasonably accurate calculation of the extent to which the soil is enriched by organic matter at given depths of soil.—D.B.

824† Miczyński, K. **A simple arrangement for concentrating dilute plant saps for paper chromatography.** *Bull. Acad. polon. Sci.* 1957, **5**, No. 7–8, 227–30, bibl. 6, illus. [Coll. Agric., Cracow, Poland]

The method consists in continuously dropping the investigated solution on the paper by means of an automatic capillary micro-pipette. The applied solution is simultaneously dried in a strong current of heated air. It is essential to prevent the moistened area on the paper around the point of the pipette from becoming too large. This can be successfully checked by adjusting the rate of outflow of liquid from the capillary to the rate at which the moistened spot dries on the paper. Thus, the desired concentration of the sample is obtained on a relatively small area even from the most dilute solutions, without the whole operation taking much time.—Extract. M.H.

825† Behr, G. Kolorimetrische Bestimmung von Chlorophyll in frischen Pflanzen. [**Colorimetric determination of chlorophyll in fresh plant material.**] *Z. Acker-. u. PflBau* 1957, **103**, No. 4, 473–8, bibl. 6, illus. [Inst. PflBau u. PflZücht., Univ. Göttingen, W. Germany]

826† Nömmik, H. **An isotope dilution method for determination of nitrate in plant material.** *Acta agric. Scand.* 1957, **7**, No. 4, 389–94, bibl. 2. [Nat. Agron. Exp. Sta., Uppsala, Sweden]

827† Medvedev, Ž. A. **The synthesis and possible transport of labelled proteins through the conducting system of plants, with the help of a new method involving differentiated autoradiography of leaf imprints on filter paper.** [Russian] *Izv. Timirjazevsk. seljsk. Akad.* (*Bull. Timirjazev agric. Acad.*) 1957, No. 3, (16), 186–206, bibl. 6, illus., English summary.

See *Herb. Abstr.* 28 : 288.

828† McClelland, J. H. and Spielrein, R. E. **An investigation of the ultimate bending strength of some common pasture plants.** *J. agric. Engng Res.* 1957, **2**, No. 4, 288–92, bibl. 2, illus., French, German and Spanish summaries. [Nat. Inst. Agric. Engng, Silsoe, Beds]

An apparatus has been designed to measure

the ultimate bending strength and hence the stiffness of single stalks of plants. A plant stalk is laid horizontally on two supports 2 in. apart, a load is applied to it by a constant-speed ram, the deformation in relation to load is measured and recorded on a C.R. oscilloscope. The apparatus has also been used on oats and wheat. In both these species, the ultimate bending strength and linear density are directly related.—From authors' summary. M.P.

829 MATWEEF, M. Application de la méthode Kjeldahl au dosage rapide des protéines en vue de la sélection et de la commercialisation des céréales. [**Application of the Kjeldahl method for the rapid determination of protein with a view to the selection and marketing of cereals.**] *C.R. Acad. Agric. Fr.* 1957, **43**, No. 15, 787–95, bibl. 3, illus. [Lab. Tech. Céréales, Serv. Bot. Agron., Tunisia]

Information is given on an improved Kjeldahl method by which 2 workers can effect about 200 determinations per day (9 working hr.). The apparatus used, and its working, are described.—E.B.O.

830 †FRANKS, J. W. **Pollen analysis : a technique for investigating early agrarian history.** *Agric. Hist. Rev.* 1957, **5**, No. 1, 2–10, bibl. in text, illus.

RADIOBIOLOGY

See also Abs. 879, 880

831 KLEČKOVSKIĬ, V. M. [**The use of isotopes and nuclear radiations in agronomic research.**] [Russian] *Izv. Timirjazevsk. seljsk. Akad.* (*Bull. Timirjazev agric. Acad.*) 1957, No. 3 (16), 6–32, bibl. 119, illus., English summary.

832 CELIŠČEV, S. P. and MOGILEVKIN, V. B. [**Research on the nature of the biological effect of neutrons on plants.**] [Russian] *Izv. Timirjazevsk. seljsk. Akad.* (*Bull. Timirjazev agric. Acad.*) 1957, No. 3 (16), 33–52, bibl. 21, illus., English summary.

833 GULJAKIN, I. V. and JUDINCEVA, E. V. [**The effect on plants of radioactive fission products and their accumulation in harvests depending on their depth in the soil.**] [Russian] *Izv. Timirjazevsk. seljsk. Akad.* (*Bull. Timirjazev. agric. Acad.*) 1957, No. 3 (16), 53–80, bibl. 19, illus., English summary.

834 YATAZAWA, M. and YAMAZAKI, Y. **Absorption of fission products by plants. 5. Absorption of gross fission products.** *Soil Pl. Fd* 1957, **2**, No. 3, 158–63, bibl. 16, illus. [Nagoya Univ., Japan]

This paper deals with the absorption of the radioactive waste from an atomic pile by *Oryza sativa, Hordeum sativum, Triticum vulgare, Glycine soja, Phaseolus vulgaris, Lactuca sativa, Solanum melongena* and *Lycopersicon esculentum*. There was considerable variation in the uptake of radioactive waste by these crops. When grouped into families, the concentration of radioactive substance in the tops decreased in this order : Leguminosae and Solanaceae > Compositae > Gramineae ; and in the roots : Leguminosae > Gramineae and Compositae > Solanaceae. In rice, the radioactivity was high in the leaf blade and least in the mature grain ; fertilizers reduced the uptake of fission products.—D.B.

835 GULJAKIN, I. V. and JUDINCEVA, E. V. [**The uptake by plants of radioactive fission products and cleansing the soil of them by biological means.**] [Russian] *Izv. Timirjazevsk. seljsk. Akad.* (*Bull. Timirjazev agric. Acad.*) 1957, No. 3 (16), 81–109, bibl. 40, illus., English summary.

836 BOWEN, H. J. M. **The uses of radiation in agriculture.** *New Scient.* 1957, **2**, No. 47, 28–30, illus. [A.E.R.E., Harwell]

Some applications of nuclear radiation in agriculture are discussed, with special reference to pest control. The present costs of various types of treatment are tabulated and compared with the values of the treated products and the cost of more conventional treatment.—R.B.

MISCELLANEOUS

837† GHISLENI, P. L. Contributo alla conoscenza degli effetti degli ultrasuoni sui vegetali superiori. [**Contribution to the knowledge of the effects of ultrasonics on higher plants.**] *Ann. Accad. Agric. Torino* 1955–6, **98**, pp. 46, bibl. 44, English, French and German summaries.

The first part of this work reviews the literature on the effect of ultrasonics on higher plants, particularly on those of agricultural interest. The second part gives results from trials carried out by the author in 1952–5 to study the effect of ultrasonics on the germinating capacity and germinating energy of the seeds of different crops. In a first series of trials, in which the seeds of 10 species were tested, those of *Papaver somniferum* var. *album* were found to be the most susceptible to ultrasonic treatment (in 6 species there were no differences between treated and untreated seed ; with *Poa pratensis, Trifolium incarnatum* and *Vigna sinensis* results were limited or uncertain). In a second series of trials, in which seeds of *P. somniferum* var. *album* only were used, the optimal duration and intensity of ultrasonic treatment which favour the germinating capacity and the germinating energy of these seeds were determined.—E.B.O.

AGRICULTURAL METEOROLOGY AND CLIMATOLOGY

See also Abs. 860, 876

838† HALSTEAD, M. H. and COVEY, W. **Some meteorological aspects of evapotranspiration.** *Proc. Soil Sci. Soc. Amer.* 1957, **21,** No. 5, 461–4, bibl. 19. [Texas A. & M. Coll.]

The problem of assessing evapotranspiration in irrigated crops is discussed, and equations dealing with the relation of meteorological factors to the rate of evapotranspiration under conditions of irrigation are given.—R.B.

839† LEMON, E. R. and others. **Some aspects of the relationship of soil, plant and meteorological factors to evapotranspiration.** *Proc. Soil Sci. Soc. Amer.* 1957, **21,** No. 5, 464–8, bibl. 8. [Texas Agric. Exp. Sta., College Station]

Evapotranspiration in a large cotton field was found to be controlled by soil-moisture tension, seasonal variations in the transpiration rate, the relation of soil moisture of an irrigated area to that of its surroundings ; radiation, wind, air temperature, and humidity. The effects of these factors were investigated.—From authors' summary. R.B.

840 ARMY, T. J. and OSTLE, B. **The association between free-water evaporation and evapotranspiration of spring wheat under the prevailing climatic conditions of the plains area of Montana.** *Proc. Soil Sci. Soc. Amer.* 1957, **21,** No. 5, 469–72, bibl. 19, illus. [Montana Agric. Exp. Sta., Bozeman]

In a study involving more than 25 years of crop- and weather-data at 2 stations in the Northern Plains of Montana, evapotranspiration of spring wheat under dry-land conditions was negatively correlated with free-water evaporation. In years of high free-water evaporation, reduced crop growth and an inadequate supply of soil moisture resulted in low evapotranspiration. Wheat grown on fallow land showed more evapotranspiration per in. of free-water evaporation than wheat following wheat. The correlation between free-water evaporation and evapotranspiration per unit of dry matter produced was positive. The degree of this association was apparently reduced by limited soil-moisture supply. The effect of cultural practice, geographic location and limited moisture supply on this ratio detracted considerably from the value of free-water evaporation measurements as an indication of water use by wheat plants under semi-arid conditions.—From authors' summary. R.B.

841† BAC, S. Polowe zużycie wodne roślin uprawnych. [**Utilization of water by cultivated plants in field conditions.**] *Rocz. Nauk Roln. Ser. A* 1957, **74,** No. 4, 741–92, illus., Russian and English summaries.

On the basis of investigations conducted in lysimeters and in field conditions, the author maintains that crop yields in Polish conditions do not depend upon the sum of precipitation throughout the whole year or throughout the period of vegetation, but only upon its distribution in time. An equation has been formulated by which the water balance of a cultivated field under specific conditions can be computed. The utilization of water by certain crops in relation to soil moisture conditions is discussed.—M.H.

842 CARDER, A. C. **Growth and development of some field crops as influenced by climatic phenomena at two diverse latitudes.** *Canad. J. Pl. Sci.* 1957, **37,** No. 4, 392–406, bibl. 31, illus.

Ten annual crops representing varieties of wheat, oats, barley, peas and Siberian millet (*Setaria italica*) were grown for 2 years at Madison, Wisconsin, latitude 43°N., and at Beaverlodge, Alberta, 55°N. Climatic phenomena studied were insolation, air temperature, photo- and thermo-period, and water relations. Over the growing season, insolation was approximately equal at Madison and Beaverlodge, but the effective heat supply at Beaverlodge was only 60% of that at Madison. Under the long summer days of the more northerly latitude at Beaverlodge all crops except millet developed as well as at Madison. Millet proliferated vegetatively and did not head at Beaverlodge. The yield of seed of all crops except millet was associated with much less vegetation at the northern station. The earlier-maturing varieties did better under cool temperatures than did the later-maturing types. During the phase from heading to maturity the difference in temperature at the 2 sites was less pronounced than during emergence to heading. All varieties produced more vegetative growth at Madison, but all except millet produced heavier kernels at Beaverlodge.—From author's abstract. D.B.

843† TAKASU, K. **Microclimatic study. 4. Microclimatic characteristics of some specified surface conditions.** *Ber. Ohara Inst. landw. Biol.* 1957, **11,** No. 1, 22–74, bibl. 6, illus. [Okayama Univ., Kuraschiki, Japan]

The diurnal variations of temperature, insolation and the velocity and direction of the wind were studied on the following surfaces : a frozen lake ; snow cover in spring ; a lake in May ; a plain, at the foot of a mountain, in winter ; and a coastal dune in summer. The paper begins with a review of the earlier papers in this series, which date back to 1949, and concludes with microclimatic observations made during a total eclipse of the sun.—D.B.

844† Yamamoto, R. **Micro-meteorological conditions and growth of crop plants on a slope ground as influenced by windbreaks.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957 **26,** No. 1, 27–9, bibl. 3, illus. [Nagoya Univ.]

The diurnal changes in air- and ground-temperatures on slopes and on level ground within the shelter of a windbreak were studied. The improvement in growth of peas and beans [*Vicia faba*] under the protection of the windbreak was more noticeable on sloping than on level ground. —From English summary. D.B.

845† Grace, H. H. **Hailstorm research in Alberta.** *Agric. Inst. Rev.* 1957, **12,** No. 6, 11–14, illus.

MISCELLANEOUS

846 Agricultural Research Council. **Index of agricultural research 1957.** 1957, London, pp. 189, 12s. 6d.

See also *Fld Crop Abstr.* 5 : 1008, 1009.

847† East Malling Research Station, Great Britain. **Abstracts and index to the Annual Research Reports, 1913-1953.** 1957, pp. vi + 175, 24·5 × 18·5 cm., Maidstone, Kent : E. Malling Res. Sta.

References to grasses and legumes for cover crops, to cereal crops, potatoes and weed control are included.—M.P.

848 Journal of the Agricultural Society, University College of Wales. **Theses of students of U.C.W. Aberystwyth submitted for higher degrees 1946-1956.** *J. agric. Soc. Univ. Coll. Wales* 1957, **38,** 65–9.

The list includes 7 theses relating to field crops.—M.P.

849† Unesco. Middle East Science Co-operation Office. **Survey of scientific institutions of Egypt.** 1957, pp. 149.

850† Idia. Progreso realizado en las investigaciones agrícolas en la campaña 1954–1955. [**Progress in agricultural research (in Argentina) in 1954-5.**] *Idia* 1956, No. 106–8, 1–304, bibl. in text, illus.

851† Ministry of Agriculture, Fisheries and Food, England and Wales. **Crop Protection Products Approval Scheme. Approved List 1957.** *Publ. Minist. Agric. Fish. Fd, Eng. and Wales* 1957, pp. 52.

852† Commonwealth Scientific and Industrial Research Organization. **Locusts and grasshoppers.** *Leafl. 19 CSIRO* 1957, pp. 20, bibl. 23, illus.

Most of the 500 or more species of locusts and grasshoppers occurring in Australia do appreciable damage. Notes are given on the species of greatest economic importance, and the control measures available are discussed ; they include insecticidal baits and sprays, such as BHC (crude) at 1·5 – 2 lb./ac. in solution.—M.P.

853 Woodworth, C. E. and Lane, M. C. **Insecticide residues in wireworm control.** *J. Econ. Ent.* 1957, **50,** No. 2, 222–3.

In a field selected near Prescott, Washington, the best control of wireworms (mainly *Limonius californicus*) was obtained by applying heptachlor at 4 lb./ac. ; residues were effective for at least 2 years.—J.F.G.

854 Wilkinson, A. T. S. **Chemical control of the European wireworm *Agriotes obscurus* (L) in the Lower Fraser Valley of British Columbia.** *Canad. J. Pl. Sci.* 1957, **37,** No. 4, 413–17, bibl. 1, illus. [Entom. Lab., Vancouver, Brit. Columbia]

The wireworm, *A. obscurus*, was controlled in silty loam at Agassiz, British Columbia, from 1953 to 1956, by insecticides incorporated into the soil. Single applications of aldrin or heptachlor at 5 lb. of toxicant per ac. gave good protection to potatoes planted a month after application, and gave 100% mortality of wireworms by the second or third season. Aldrin at 2·5 lb., DDT at 15 lb., and granulated heptachlor at 3 lb. [per ac.] did not give adequate control in the year of application but gave appreciable control in the third and fourth seasons. Ethylene dibromide at 1·6 gal. per ac. did not give control.—Author's abstract. D.B.

855 Hartzfeld, E. G. **Terraclor–a new soil fungicide.** *Agric. Chem.* 1957, **12,** No. 7, 30–3, illus.

Damping-off of cotton, due to *Rhizoctonia solani*, can be controlled by 4–5 lb./ac. of active terraclor (PCNB) applied to the seed and surrounding soil at sowing ; but where *Pythium* and *Fusarium* are also involved, other fungicides must be added. In the control of clubroot (*Plasmodiophora brassicae*) of crucifers, application of terraclor may raise the yield by 3–5 tons/ac. ; the best method of treatment is to use a transplant solution containing 2–6 lb. terraclor (75% wettable powder) per 100 gal. applied at 0·5–0·75 pt. per plant. Wirestem or black root (*Rh. solani*) of crucifers can be controlled by applying terraclor at 50 lb. actual/ac. in an 8-in. band on the row immediately before sowing and by rototillage to a depth of 2 in. For the control of southern blight (*Sclerotium rolfsii*)

on groundnuts, 12–15 lb. actual/ac. can be applied in a 12-in. band on the row at pegging-time. Excellent results for the control of wheat bunt (*Tilletia caries*) in the Pacific Northwest have been obtained with terraclor and it is recommended that 75% wettable powder be applied at 1 oz./bu. of seed ; terraclor is also effective against soil- and seed-borne smut.—J.F.C.

856† Spreafico, L. La certificazione delle sementi in Svezia. [**Seed certification in Sweden.**] *Sementi elette* 1957, **3**, No. 6, 28–36, illus., English and German summaries. [Ente Naz. Sementi Elette]

857† United Nations. **World weights and measures. Handbook for Statisticians.** Provisional edn, *Statist. Pap. M 21*, 1955, pp. 225, 27 × 21 cm., New York, 15s. [Received Nov., 1957]

858† OEEC. **Agricultural policies in Europe and North America. Price and income policies.** *2nd Rep. Minist. Comm. Agric. Fd* 1957, pp. 447.

REPORTS

The notes below indicate the main investigations in the reports covered, in so far as they concern this journal. Where a separate abstract has been made from a particularly interesting section of a report, this is indicated.

859 **Northern Ireland.** The Research and Experimental Record of the Ministry of Agriculture, Northern Ireland, 1956, Vol. 6. Belfast, 1957, pp. 233, illus., 7s. 6d.

1. Cereals, pp. 151–2. Top yields of grain and straw under conditions of high soil fertility were given by the oat varieties Marne and Sun II, and under low-fertility conditions by Ayr Line and Stormont Grandee. Bonus was the outstanding barley variety, with a high grain yield, good resistance to lodging and early-ripening.

2. Flax, pp. 156–7. Wiera and Noblesse were again outstanding. Yield-assessment trials by the Loughall (whole plot) and Wageningen (4-lb. samples of dry unseeded straw) techniques showed fairly close agreement in the highest and lowest long-fibre yield groups only. The Loughall method was considered preferable for future use.

3. Potato variety trials, Greenmount, pp. 195–9. Ulster Prince and Arran Pilot were the highest-yielding of the 1st-early varieties ; Ulster Ensign of the 2nd-earlies ; Ulster Supreme and Arran Banner of the maincrop varieties. The yellow-fleshed varieties Ulster Gozo, Ulster Malta, Clarke P.4/1 and Clarke 961 compared favourably with Bintje in yield and cooking quality.—M.P.

860 **Sweden.** Berättelse över Nordiska Jordbruksforskares Förenings Tionde Kongress. Stockholm, 1956. [Report of the 10th Congress of Scandinavian Agricultural Research Workers. Stockholm, 1956.] *Nord. JordbrForskn.* 1956, **38**, No. 3–4.

1. Wind erosion trials at Ugerup [Sweden]. By E. Svensson, pp. 289–94. The results of experiments to determine the effect of wind shelter on crop yields are discussed.

2. Microclimatic studies on winter oil-seed crops. By B. Torssell, pp. 316–20. [See Abs. 756.]

3. The microclimate and frost. By Y. Pessi, pp. 321–3.

4. Recent results of studies on combine harvesting. By E. Åberg, pp. 345–51. Aspects discussed include : the process of ripening in grain and its significance for combine-harvesting ; the incidence of grain losses through lodging, stem and ear breakage and shedding ; and the baking quality of grain at different stages of maturity.—P.J.B.

861 **Netherlands.** Centraal Instituut voor Landbouwkundig Onderzoek. Verslag over 1956. [Central Institute for Agricultural Research. Report for 1956.] Wageningen, 1957, pp. 34.

This is the last report of the Central Institute for Agricultural Research, which, in September 1956, ceased to exist as such. Its scientists have now been allotted to, and its activities undertaken by, 3 Institutes located at Wageningen. They are : (a) the Institute for Biological and Chemical Research on Field Crops and Herbage ; (b) the Experiment Station for Field Crop and Grassland Husbandry ; and (c) the Institute for Storage and Processing of Agricultural Produce.

1. Manuring of fodder-beet, p. 13. On heavy, sandy soil manuring with Ca and Mg had a good effect, but yield increases were very small. A late top-dressing of superphosphate had very little effect. The keeping quality of fodder-beet was influenced by manuring with K, Na and Mg. For good keeping quality the optimal dose of N was 90–120 kg./ha. Irrigation was detrimental to keeping quality, as was also, in one case, a dressing of boron, although this reduced the incidence of heart rot caused by B-deficiency.

2. Potatoes, p. 13. In comparisons between preparations containing Zn and Cu for controlling Phytophthora, a considerably higher tuber yield was obtained from the use of Zn.

3. Experiments in photoperiodism, p. 13. Studies on the responses of different plants to daylength are reported. Flax had moderate day-length requirements. The period of sensitivity to day-length in cereals, except maize, began at the appearance of the third leaf, and in poppy and flax when the first leaf unfolded. A method for

determining the response of maize is described and showed a very early Turkish maize to be almost neutral in response to daylength.
4. Cereals, pp. 13–14. Rye and oats were very susceptible to damage from heat ; yellow oats were less so than white. Varietal differences in sensitivity to heat were considerable in wheat. Summer barley and oats were resistant to rain damage. In a long-duration liming trial, winter barley was extremely sensitive to low pH. Under no pH conditions could barley compete with rye in a mixed culture ; final grain yields contained, at most, 17% barley.
5. Peas, p. 14. Attack by weevils [*Sitona* sp.] produced serious yield losses ; early-season control is necessary and may be used even in May if there is mass attack. On clay soil, peas tolerated a sowing depth of 12 cm. Peas grown on sand or reclaimed peat soil had a lower culinary quality than peas grown on clay or gravel.
6. Experiments with potatoes, pp. 14–15. These included studies on : resistance of seed potatoes to rot : the influence of soil type on culinary value ; the increases in the Cl-content of the leaves of plants receiving small amounts of N fertilizer ; the effect of N upon potatoes grown on sand, in particular, on their taste. Three developmental phases in the potato plant were distinguished. The first phase ends at flower-setting, whereupon tuber formation begins and leaf growth stagnates. The third phase begins when the number of light-hours per day falls. Tuber formation is then greatly stimulated and leaf weight decreases.
7. Herbicides, p. 15. DNC at the rate of 10 kg. in 50 l. water per ha. effectively killed the foliage of lupins grown for seed. Dalapon was promising for controlling couch grass [*Agropyron repens*]. The effect of IPC and CIPC on peas and that of CMU on beans appeared to depend largely upon rainfall ; with high rainfall, the crop was damaged.—G.M.R.

862 **Switzerland.** Eidgenossische Landwirtschaftliche Versuchsanstalt, Zürich-Oerlikon. Report of activities for 1956. *Landw. Jahrb. Schweiz* 1957, **71**, No. 4, 303–71, illus.
1. Cereal trials, pp. 348–50. [See also *Fld Crop Abstr.* 10 : 1218.] (a) Winter-wheat. Cappelle suffered more than other varieties during the severe winter of 1956, and died out completely. Heine VII overwintered successfully. (b) Spring-wheat. After 4-yr. trials Svenno was provisionally accepted for the official list. (c) Winter-barley. Several varieties were compared with Riniker. Those which combined high resistance to lodging with high yields were : Breustedts Atlas, Peragis Stamm 3411, Peragis Melior and Hauters Wintergerste. Riniker germinated more quickly than other varieties and remained the earliest-maturing. (d) Spring-barley. Ackermanns BJM 34 was provisionally accepted for the official seed list, as Ceresia. In the brewing-barley trials, Domen showed the greatest resistance to lodging. (e) Maize. Orla 266 remained the highest-yielding hybrid.
2. Oil crops, p. 358. Rape varieties overwintered well in spite of the severe frost in February, 1956. The earliest-maturing varieties were Svalöfs Tenus, Svalöfs Matador, Hammenhögs Plus and Dippes Platswiderstandsfähiger. Hammenhögs Plus gave the best seed yield with 36·2 kg. per are.—D.B.

863 **Jordon, Hashemite Kingdom of.** Annual Report of the Agricultural Research Service of the Ministry of Agriculture for the year 1956. Deir Alla, 1957, pp. 58. [Received Jan., 1958]
1. Most of the work reported was carried out at the Deir Alla Research Station, in the Jordan Valley, under irrigation. Here wheat is the most important single crop, the sown area amounting to 49% of that cultivated. Gabo wheat, introduced from S. Australia during 1952/3, shows considerable promise. Varietal trials, pp. 9–16. Late-heading varieties of wheat are inferior in yields to early-heading types and are more heavily attacked by rust.
2. Barley experiments, pp. 16–19. Yield of 24 varieties were compared at the Deir Alla and Jenin Centres. At Deir Alla yields ranged from 388·3 kg./dunam (= 0·247 ac.) for Paphitico to 77·5 for C. 144 ; at Jenin yields ranged from 151 kg./dunam for Velvon to 20·8 for C 144.
3. Rice varieties, trials on sowing date, Deir Alla, pp. 20–2. The heading of plants from all sowings (15 April, 1 May, 15 May and 31 May) occurred at the end of August. Grain ripening in all sowings occurred 17–21 days after heading. The optimal sowing date is apparently 15 May.
4. Cotton, pp. 25–34. The effects of spacing and of spraying with insecticides to control *Earias* sp. No control was effected at Deir Alla by any of the insecticides tested. A spacing of 60 × 35 cm. results in larger plants with more buds, while spacing at 60 × 20 cm. produces earlier bolls. It is suggested that early-fruiting varieties combined with close spacing may avoid damage by *Earias* sp.
5. Flax varietal and manurial trials, pp. 34–5. The mean yield of all varieties tested during the last 2 years is approx. 72 kg. of finished fibre and 53 kg. seed per dunam. It is suggested that at current world prices, flax would be a profitable alternative to wheat as a winter crop.
6. Linseed, sowing-date trial, pp. 37–8. Under conditions of the test, sowing date (3 and 19 Dec., 2 and 17 Jan.) had little effect on preflowering period (the mean number of days from sowing to 80% flowering for all seedings being 75·5 ± 1·94 days) or upon the number of days (approx. 140) for the crop to reach maturity.
7. Sugar-beet, varietal trials, pp. 38–9. Of 6 varieties tested, no significant difference was

obtained between yields of any of the varieties (sugar content averaged 15·9%).—M.H.

864 **Ghana.** Department of Agriculture. Annual Report for 1954–55. Accra, 1957, pp. 53, 1 map, 3s. 6d.

1. Fibres, p. 11. At Ejura, *Urena lobata* grown at a spacing of 7 in. × 6 in. yielded 1360 lb. dried fibre per ac. The fibre was rather coarse.

2. Groundnuts, p. 12. Natal Common was consistently the best yielder at Wenchi and Ejura, with Kumawu, No. 146 and Korontos also yielding well. In a spacing trial, 6 in. yielded a little better than 9 in.; there were no apparent benefits from sowing double rows. Yield differences from sowing shelled or unshelled seed were slight.

3. Yams, p. 13. At Ejura, staking significantly benefited yields. Capping with grass increased the yields 60% above that from uncapped mounds. The most economical size of seed yam was *c.* 3 lb. —M.P.

865 **Mauritius.** Department of Agriculture. Annual Report for 1955. Port Louis, 1957, pp. 108.

1. Potatoes. A trial at Curepipe Experiment Station with the variety King George V, to determine the best time for planting potatoes, showed that the highest yields were obtained by planting in June, July and August (2468 kg., 2722 kg. and 2178 kg./ac., respectively), p. 40. At Richelieu Experiment Station, an economical manuring was 150 kg. sulphate of ammonia, 65 kg. superphosphate and 15 tons farmyard manure, per ac., the average yield being 11·5 metric tons/ac., p. 46. At Pamplemousses Experiment Station the spacing 18 × 9 in. was significantly better than 18 × 12 in. and 18 × 15 in., p. 46.

2. Rice. In a spacing trial with the variety Makalioka under dry conditions, there was no significant difference between the yields with the spacings 9 × 9 in. and 12 × 12 in., but these were better than 6 × 6 in., p. 40.

3. Groundnuts. A trial showed that the spacing 12 × 12 in. was better than 12 × 15 in. or 12 × 18 in. There were no significant differences between 3, 4 or 5 seeds per hole. In a varietal trial, Cabri yielded best with 2520 kg./ac., followed by Manyema (2225 kg./ac.) and Tennessee (1980 kg./ac.), p. 42.

4. Maize. The spacings 3 × 1½ ft. and 3 × 2 ft. were significantly better than 3 × 1 ft., p. 46.

5. Yams. In a varietal trial, Lisbon was best with 15,093 kg./ac. (net yield) followed by Angiliala (12,690 kg.) and Rattawali (12,527 kg.), p. 55. —E.B.O.

866 **Hong Kong.** Annual Departmental Report by the acting Director of Agriculture, Fisheries and Forestry for the financial year 1955–56. Hong Kong, [n.d.], pp. 95, illus.

Information is given on land utilization and rice-growing (area, yield and manuring).—E.B.O.

867† **New Zealand.** Department of Statistics. The official yearbook, 1957. Sixty-second issue. Wellington, 1957, pp. xxxvi + 1268, map. [Received Jan., 1958]

[See also *Fld Crop Abstr.* 8 : 1151.] This latest compilation includes a section on farm production in which a general account is given (pp. 508–29) of the areas devoted to farm products of various kinds, and from this account the extent to which the New Zealand economy is dependent on grassland emerges. There is also detailed information on several crops, their acreages and yields. While throughout New Zealand animals can graze for practically 12 months of the year, the winter growth of grass is such that the use of supplements for stock feed is necessary. In some districts supplementary fodders are also necessary in the drier summer months. The total area of supplementary fodders rose from 1,544,571 acres in 1950/1 to 1,691,417 in 1954/5. The area under oats, on the contrary, declined steadily during the past decade, the greatest decrease being in oats grown for chaff, hay, and silage. This decline coincides with the replacement of horses by machinery on the farms. Although wheat is the most important grain crop in New Zealand, there has been an irregular decline in sowings, especially since 1943. In 1955/6 only 68,300 acres of wheat were harvested, compared with more than 200,000 acres before 1938. Yields per ac. have shown some fluctuations during the period 1927/56, from approx. 38 bu./ac. in 1927 to 44 in 1951/2 and 39 in 1955/6. The total wheat yields, however, follow the downward trend of the sown acreage (p. 522).—M.H.

868 **USA.** Florida Agricultural Experiment Stations. Annual Report for the fiscal year ending June 30, 1956. [n.d.], pp. 351.

1. Nutrition and physiology of the peanut. By H. C. Harris and others, pp. 42–3. Moderate amounts of Ca applied to the fruiting zone of groundnuts resulted in good yields ; the same amount applied to the rooting zone only, gave poor yields. Application of Ca to both parts of the plant was not better than applications to the fruiting zone. Boron deficiency, as evidenced by heart-rot in the groundnuts, was marked where no B was applied. The soil used in these trials was Blanton fine sand, with a low content of all nutrients.

2. Herbicidal control of weeds in peanuts and oats. By E. O. Burt, p. 47. Excellent control of weeds, with little injury to groundnuts, was obtained by pre-emergence treatment with dinoseb at 6, 9 or 12 lb. active ingredient/ac., diuron at 0·5 or 1 lb./ac., SPCP at 12 and 16 lb./ac., CDAA at 4, 8 and 12 lb./ac., CDEA at 8 and 12 lb./ac. and CDEC at 8 and 12 lb./ac. Post-emergence

treatment with dinoseb at 1·5 to 4·5 lb./ac. gave complete control of broad-leaved weeds, injured grass weeds and resulted in slight to moderate foliage-burn of groundnuts. With oats, applications of 2,4-D ester at 0·5 lb. a.e./ac., 2,4-D amine at 0·5 to 2 lb./ac. and dinoseb at 0·5 lb./ac. at the 3–4-leaf stage, gave very good control of weeds, with little injury to the oats. MCPA amine and ester formulations were less toxic to weeds than 2,4-D amines and esters.

3. Herbicidal control of weeds in corn and soybeans. By E. O. Burt, pp. 49–50. Pre-emergence treatment with 6 lb. dinoseb per ac., 2,4-D low-volatile ester at 2 lb./ac. and diuron at 1 and 2 lb./ac. gave good control of broad-leaved and grass weeds with little injury to maize. Post-emergence treatment with 1·5 lb. dinoseb + 0·5 lb. diuron/ac. gave excellent weed control with slight temporary injury to maize. With soyabeans sown on 2 dates, only pre-emergence SPCP at 8 lb./ac. gave good results at the first sowing date ; at the second sowing date, when the soil-moisture content was higher, SPCP at 4, 8 and 12 lb./ac., CIPC at 3, 6 and 9 lb./ac., CDAA, CDEA and CDEC, all at 8 lb./ac., diuron at 0·5 lb./ac. and dinoseb at 3 lb./ac. all gave good weed control, with little or no injury to the soyabeans. Post-emergence treatment with 0·75 and 1·5 lb. dinoseb/ac. also gave good results.

4. Control of nutgrass (*Cyperus rotundus*). By E. O. Burt, p. 52. Of a wide variety of herbicidal and cultivation treatments tested, best kill of nutgrass followed the use of 2 or 4 lb. a.e. of low volatile ester of 2,4-D, followed by discing, repeated at 10- to 20-day intervals to give 3 discing and 2 herbicidal treatments.

5. Control of potato seed-piece decay. By G. D. Ruehle, p. 310. Of a number of treatments used, either a wet-dip treatment of 6 lb. captan in 100 gal. water for 1 min., or dusting the seed-pieces with a 25% captan dust, gave the best control of seed-piece decay.—P.J.B.

869 **International.** Eleventh International Seed Testing Convention, Paris 1956. *Proc. internat. Seed Test. Ass.*, 1957, **22**, No. 1, pp. 578.

Among papers presented were the following :

1. Report on the activities of the Provenance Committee. [In German] By E. Frey, pp. 122–34. The use of *Helminthia echioides* and other weed species and of the microscopic examination of sections of mineral particles found in seed samples as indicators of provenance, are reviewed.

2. On the identification of plant characters by testing the resistance of seeds to the toxic action of potassium chlorate. By M. Yamasaki, pp. 175–9. [See Abs. 588.]

3. Contribution to the study of the phenomenon of dormancy in *Hordeum vulgare* L. By M. Blanchard, pp. 192–5. The germination of Algerian spring barley at 2, 3, 4 or 5 months after harvest averaged 30, 46, 90 and 99%, respectively. The germination of seed 25 days after harvest was markedly increased by incising the seed, or by refrigeration (8 days at 5°C.) before germination. A combination of incision + refrigeration increased germination to 99%. The cause of low germination in newly-harvested seed was thought to be the low permeability of the seed coat to O_2.

4. Investigations on the germination and some other qualities of beet seed. By C. Stahl, pp. 258–67. [See Abs. 639.]

5. Investigations on maintenance of germinating capacity in beet seed. [In German] By H. Eifrig, pp. 269–75. [See Abs. 640.]

6. The use of soil tests in seed testing. By A. F. Schoorel, pp. 287–98. The 2 questions discussed are : (a) to what extent are germination figures reliable for evaluating the value of seed in the field ?, and (b) to what extent are soil tests in greenhouses of value for evaluating the field value of seed ?

7. X-ray inspection in seed testing. [In German] By M. Simak and others, pp. 330–40.

8. Routine investigation of seeds for their health condition in the Dutch Seed Testing Station, Wageningen. By J. de Tempe, pp. 354–65.

9. Seed-borne diseases and seed treatment. Studies carried out in France. [In French] By H. Darpoux and J. Ponchet, pp. 375–89. The occurrence of the major seed-borne diseases of cereals, sugar-beet, flax, colza and carrots in France is reviewed and the results of seed-treatment trials are reported, with notes on the phytotoxicity of fungicides used. [See also *Fld Crop Abstr.* 10 : 977.]

10. Ethylene dibromide as seed fumigant, and its absorption by oil seeds. By M. Plaut and others, 392–9. The studies reported relate to soyabeans, sunflower, sesame, linseed, groundnuts and sorghum.

11. Investigation of the influence of some storage conditions on the ability of seed to retain its germinating capacity. By S. B. Madsen, pp. 423–46.—P.J.B.

BOOKS

870 Matsuo, T. **Rice culture in Japan.** 2nd edn, 1957, pp. 144, illus., 18 × 26 cm., Tokyo : Yokendo Ltd., 16s.

The early sections of this book deal with the history and present position of rice cultivation in Japan and give some data on the import and consumption of rice. The major part of the work is devoted to a study of the cultivation of the rice crop and there are sections covering the following aspects : the ecology of the rice crop and the geographical distribution of rice-growing areas ; the development of rice-growing techniques ; details of the transplanting method for swamp rice ; upland-rice varieties and their cultivation ; future problems. In this second edition a section has been added on the life history and cytology of the rice plant. Throughout the book one gleans something of the history of agriculture in Japan, the importance of the Meiji Restoration (1868) for agricultural practice and the organization and governmental direction of agriculture in Japan. The book has been translated from the Japanese by Mr. Yoshio Suguki.—D. Brown.

871 Cardozier, V. R. **Growing cotton.** 1957, pp. xxi + 423, illus., 23 × 16 cm., USA : McGraw-Hill Book Co. Inc., 43s. 6d.

' Growing Cotton ' is published as one of the McGraw-Hill Rural Activities Series. It is addressed to the cotton grower in the USA, and not to the scientist or directly to the extension worker. Once this is grasped it can be seen how extremely well the author has done his work. For example, the first chapter does not, as in most text-books on cotton, describe the cotton plant. It is called " Deciding to grow cotton ", and it provides the grower with a basis for deciding whether the crop is likely to be profitable to him, and, if it is, where and on what acreage to grow it. The next chapter follows logically with the choice of varieties ; though it is pointed out that in California only the Acala variety may, by law, be sown. From here the reader is led through sowing, cultivating, husbandry and pest- and disease-control up to harvesting and marketing.

Scientific technicalities are explained in a most competent manner in language that the educated farmer is likely to understand. A bare sufficiency of experimental data is quoted in tabular form, but it is not enough to clog the text for the non-scientist. In some phrases the authentic voice of the extension worker is heard. For example, in discussing inter-row cultivation, the question is asked " Will the rotary hoe also destroy cotton plants ?" The answer given is " Yes, but not as many as you would think." This is not a scientific statement, but, for a first approximation, it probably tells the farmer more than a table of statistics.

The author contrives to be simple and lucid on such diverse and difficult subjects as the construction of cotton-picking machines and the working of futures markets. Administrative topics which may concern the cotton grower are also dealt with, such as the system of certification of cotton seed and the use of the government-loan programme.

Does all this mean that the book will fail to interest the scientist concerned with cotton or the reader outside the USA ? The answer is again " Not as much as you would think." Dr. Cardozier has such a wealth of scientific and practical knowledge about cotton-growing that there will be few indeed who could not learn something from his book. For the non-American reader, it presents a realistic picture of current conditions in the USA where old and simple methods in cotton-growing still survive alongside the new and the mechanized. It is conceded that with less than 30 acres under cultivation mules may still be more economic than a tractor, and the same sympathy and attention are given to the problems of the one form of organization as to the other.

But what this book provides above all is an object lesson in translating scientific knowledge into language intelligible to the farmer without forfeiting the respect of scientists. The cotton growers of the USA are lucky to have it available to them.—G. B. Masefield.

872 Sethi, B. L. and Dharmarajulu, K. **Indian cotton—its past, present and future.** 1957, pp. 54, illus., Bombay : Indian Cent. Cott. Cttee, Rs. 3.

873† Schindlmayr, A. [Translated and edited by Jackson, A. A. and Jackson, Jean P.] **Useful plants.** 1957, pp. 127, bibl. 13, illus., 22 × 13·5 cm., London : New York : Thames and Hudson, 21s.

" This book describes and illustrates the crop plants which are to be found growing in the farms, market gardens and in the private gardens of Britain and N.W. Europe." It has been translated from the German and adaptations have been made, presumably, in its contents for readers in Britain. The bibliography refers to publications in English. Over 200 plants are briefly described and their scientific and common English names given, together with information relating to their cultivation, yield and use. The crops are grouped under : forage plants ; cereals ; roots ; oil-plants ; fibre-plants (including common nettle, *Urtica dioica*, ' occasionally used in times of emergency for fibre ') ; miscellaneous plants and vegetables.

Of the 338 illustrations, 32 are in colour, and 104 relate to the botanical terms used in the text. The line drawings are very clear, but often too

small. Some unnecessary duplication has occurred, e.g. the maize ear has been illustrated 3 times, once in colour, and twice as line drawings in the fodder- and cereal-sections. The illustrator assumes that the reader is interested mainly in the plant when in flower, whereas other details, such as the leaf-blade, -sheath and ligules of grasses and the seeds of some legumes, could have been included with advantage.

Nor is the book without its errors, such as : Safflor for Safflower, Orach for Orache, *Borrago* for *Borago*, *Urtica dioeca* for *U. dioica* and *Onobrychis viciaefolia* for *O. vicifolia*. References to the Brassicas do little to clarify the uncertainty of their nomenclature. Instead of, or as well as, including these plants under forage-, root- and oil-crops, they could have been grouped together under the general heading ' Brassicae'.

The book is one of a series of ' open air guides'. It is handy, well-printed, well-illustrated, and informative. But it lacks practical detail, for instance the seed rate is given, but not the date of sowing (except in the case of vegetables) ; no identification key is given ; nor is there any mention of the range of varieties available, or even of the existence of crop varieties.—M. Pennington.

874 McKay, R. **Cereal diseases in Ireland.** 1957, pp. vii + 161, illus., bibl. at end of chaps, 25 × 16 cm., Dublin : Arthur Guinness, Son and Co. Ltd., 21s.

The successful growth of healthy cereals is of great importance to Irish agricultural economy. This book is a guide to the identification of cereal diseases in the field and their occurrence in Ireland. It is intended to help grain growers and to serve as a comprehensive work of reference. Its value is enhanced by the many excellent illustrations.—A. G. G. Hill.

875 Halperin, H. **Changing patterns in Israel agriculture.** 1957, pp. xii + 290, 23·5 × 15 cm., London : Routledge and Kegan Paul Ltd., 28s.

The present structure of Israel's agricultural production is one of predominantly small farm units producing, in the main, high-value crop and livestock products. This structure is as much the result of political as of economic policy. The various agencies responsible for Jewish immigration and settlement have, in their desire to absorb as many immigrants as possible, adopted a standard farm size of only 7½ irrigated acres per family. These units are too small to grow the staple grains efficiently, and much animal fodder, and most of the grain for human consumption, has to be imported. In 1952 Israel grew only 12 per cent. of the wheat she consumed.

Mr. Halperin's book is particularly useful for the full description it gives of both the geographical and the social background of Israel's agriculture today. The detailed description of the various forms of collective and co-operative settlement succeeds admirably in clarifying many of the distinctions which are often a difficulty to the student who does not read Hebrew. But the reader is left with an unsatisfied curiosity as to the relative economic efficiency of the various types of farm settlement. This book is an essential possession for anyone seriously interested in Israel's agriculture, particularly for its chapters on agricultural geography, land and water.—From *Farm Econ.* 1957, Vol. 8, No. 10.

876† Hudson, J. P. [Ed.] **Control of the plant environment. Proceedings of the University of Nottingham Fourth Easter School in Agricultural Science, 1957.** 1957, pp. xvi + 240, bibl. at end of papers, illus., 22 × 14 cm., London : Butterworths Sci. Publ., 42s.

This symposium, devoted to the " Control of environment in crop experimentation ", reviewed results primarily of horticultural interest but which are also of considerable interest to agricultural research workers. Technical problems of such experimentation are dealt with and a critical approach to the use of controlled environments and the interpretation of results is noticeable in most papers and the discussions which follow them. In ' Agronomical aspects of environmental control ', A. H. Bunting and Phyllis M. Cartwright (Reading) discuss the possible application of environmental control to crop husbandry. They restrict the term agronomy to the ' study of physiological and ecological relations of plants growing in economic culture '. They review the importance of accurately assessing edaphic and aerial factors, and the limitations of experiments in controlled environments as regards subsequent application of the results to field trials. They make a plea for broader bases of observation and measurement in an attempt to obtain the fullest information possible from an experiment.

Part 1, on the effect of the environment on plants, includes a review, by S. J. Wellensiek (Wageningen), of experiments on the effect of temperature, light and water (soil-moisture content and relative humidity of the air), and their relationships, on plants. Reference is made to E. J. Fontanier's work on groundnuts [see *Fld Crop Abstr.* 10 : 1410]. The importance of these environmental factors in relation to the experimental climate for growing plants and in assessing a climate for a particular crop is discussed. Some results, S. J. Wellensiek said, suggested that thermoperiodicity was not a general phenomenon and that its expression was influenced by other factors. In the discussion F. L. Milthorpe supported this and referred to similar conclusions drawn from his work on cucumbers. W. C. Schwabe (London) was concerned primarily with the morphogenetic aspects of development, and he gave examples

largely from horticultural crops. Plant growth was reviewed by E. C. Wassink (Wageningen), mention being made of the photosynthesis of crop plants such as sugar-beet and turnips and of the efficiency of light/energy conversion. Controlled environments in the study of plant genetics was discussed by P. T. Thomas (Aberystwyth), and he cited the work on *Lolium* carried out by J. P. Cooper, and results with flax.

The spectral composition of lamps for use in controlled environments considered in relation to photosynthetic, photomorphogenetic and photoperiodic phenomena was the subject of a paper by Daphne Vince and R. H. Stoughton. They considered that fluorescent lamps were the most suitable because they give little infra-red radiation and have less direct heating effects on plant tissues, and also offer a much wider choice of spectral composition than other lamps. 'Wind as a factor in plant growth' by E. H. Whitehead (Oxford), dealt mainly with the effect of wind speeds on plant growth form, root- and shoot- dry-weight.

Papers in Part 2 were concerned with the control of environmental factors for plant experimental work. J. P. Hudson (Nottingham) discussed plant responses to soil moisture; means of assessing soil moisture; the concept of water regime and its application to experimental work and irrigation. W. C. Lawrence (John Innes Hort. Inst.) reviewed light intensity and air temperature as affected by the siting and structure of glasshouses; while the technical and economic aspects of the design of growth rooms were dealt with by L. G. Morris (NIAE).

Part 3, on 'Installations for the control of plant environments', describes and discusses recent developments in phytotrons, growth-rooms and -cabinets, automatic plant covers and wind tunnels. This is followed by Part 4 in which brief notes are given on the demonstrations presented to the symposium on equipment available, and some results obtained, mainly with horticultural crops.

Finally, reference must be made to the constructive and practical discussions in the paper by J. P. Hudson on 'General aspects of environmental control'. In this he has incorporated points raised by speakers during the discussions, including the purposes of controlling environments; features of design of growth-rooms and -cabinets; control of light and temperature; and policy in developing controlled environments.—M. Pennington.

877† Terrien, J. and others. **Light, vegetation and chlorophyll.** 1957, pp. 228, bibl. 13, illus., 19 × 12·5 cm., London: Hutchinson and Co., 15s.

In this translation (by Madge E. Thompson) the two French books "Lumière et Végétation" and "L'Energie Chlorophyllienne" have been slightly adapted and combined in one publication. —M.P.

878 Jacob, A. [Trans. by N. Walker]. **Magnesium. The fifth major plant nutrient.** 1958, pp. xii + 159, bibl. 487, illus., London: Staples Press Ltd., 22 × 14·5 cm., 40s. [First published in German, 1955]

The opening chapters of this book deal briefly with the chemical properties of Mg and with the Mg-content of plants. Mg-deficiency symptoms are shortly described for a wide range of crop plants and these are followed by an account of the role Mg plays in the plant—its importance for chlorophyll-formation being stressed. There are other sections dealing with the balance of Mg in agricultural practice and the use of its compounds in manurial programmes. There is a bibliography of 487 references but no index.—G.L.S.

879† Dick, W. E. **Atomic energy in agriculture.** 1957, pp. x + 150, illus., 22 × 14 cm., London: Butterworths Sci. Publs Ltd., 15s.

This book is a digest of a selection of papers given at the International Conference for the Peaceful Uses of Atomic Energy, held in Geneva in 1955. As a background to his resumés of papers on the contribution of atomic energy to agricultural research, Mr. Dick gives a detailed description, and the historical development, of the biological research-projects under discussion.

The utilization of radio-isotopes as a tool in agricultural research is by virtue of their radiations. Firstly, extensive changes are brought about in biological material as the result of irradiation, and secondly, the ease by which radiations can be detected enables the use of radio-isotopes as tracers in the study of the behaviour of their stable isotopes.

The effect of radiations *per se* is discussed in the first chapter dealing with radiation genetics. The author reviews the evolution of new varieties in the USA by irradiating maize plants in the field from a powerful source of ^{60} cobalt. The inducing of rust-resistance in wheat and oats by X-rays and neutrons is described. In chapter 4 yet another effect of radiations is dealt with, namely, the eradication of the screw-worm fly (*Callitroga hominivorax*) by releasing irradiated males. The females on mating with such males produce sterile eggs.

Radiations, when applied in high dosages, have a lethal effect. Weevils infecting foodstuffs in storage can be eliminated, the spoilage of meat, dairy products, vegetables and fruit by micro-organisms can be prevented, and the sprouting of root crops can be inhibited. Chapter 6 is devoted entirely to a critical appreciation of the advantages and disadvantages, as well as the economics, of radiation-sterilization of food.

The use of radio-isotopes as tracers is reviewed with reference to: the elucidation of the biochemical processes involved in photosynthesis; the uptake of soil carbon-dioxide by roots and its contribution to total carbon assimilation (this is a

very novel approach by Russian workers) ; the fixing of phosphorus in the soil and the estimation of its availability both in the soil and in fertilizers—a report based to a large extent on the work of the Oxford workers ; the elucidation of the mechanism of resistance to DDT in resistant flies, the effect of methyl-bromide fumigation on stored grain and flour and the study of insect physiology by labelling insects with ^{60} cobalt. Other tracer studies reported are the discovery of the existence of natural root grafts in forest trees, the transmission of oak wilt (*Endoconidiophora fagacearum*) through such grafts, the transport of the spores of this fungus by the sap stream, and the mechanism of wilting in infected trees. Another aspect of plant pathology mentioned is the study of the action of sulphur fungicides by means of labelled sulphur(^{35}S).

This is an informative book, written in a fluent and popular style which should appeal to the general reader whose interest and imagination are kept alive throughout. The scientist would probably prefer to read the original papers. The general reader for whom the book is primarily written might have benefited from an introductory chapter on the elementary aspects of atomic energy and by a glossary of selected terms of nuclear physics. The author describes tracer techniques including auto-radiography but only in the last chapter does he explain such terms as neutrons or gamma rays. Though he continually mentions the Geiger counter he does not attempt to describe it nor does he define the term 'radio-isotope'. The book contains numerous references but misquotations occur. Thus, the work by E. C. Large, called by the author the "March of the fungi," is in fact "The advance of the fungi". The spelling of some scientific names differs from that used by the authors of the papers reported. These are, however, small points and should not detract from the value of a useful account which does much to impress on the reader the many instances in which fundamental research has led to practical applications of benefit to agriculture.—E. Grossbard.

880† Comar, C. L. [Ed.] **Atomic energy and agriculture. A symposium presented on December 27-29, 1955, at the Atlanta meeting of the American Association for the Advancement of Science and co-sponsored by the Oak Ridge Institute of Nuclear Studies.** *Publ. 49 Amer. Assoc. Advance. Sci.* 1957, pp. x + 450, bibl. at end of papers, illus., 23·5 × 15·5 cm., Washington : Amer. Assoc. Advance. Sci., and London : Bailey Bros. and Swinfen Ltd., 86s.

Of the 22 papers presented to the symposium, only the first 10 are of direct interest to readers of this journal. Papers 1–5 are concerned with soil/plant relations and include : Measurement of plant nutrient supply of soils by radioactive isotopes, by M. Fried ; Uses of macronutrient isotopes in soil fertility research, by L. E. Ensminger and R. W. Pearson ; Role of tracers in root development investigations, by G. W. Burton. Papers 6–10 deal with various aspects of plant metabolism including : Photosynthesis, by N. E. Tolbert ; Nitrogen-15 as a tracer of nitrogen metabolism of plants, by R. MacVicar ; Nutrient uptake with special reference to foliar absorption, by S. H. Wittwer ; Absorption and translocation of plant regulating compounds, by J. W. Mitchell and P. J. Linder. The papers are all reviews of experimental work using a range of field-, herbage- and horticultural-crops, in which radioactive isotopes were used as tracers. Further possible applications of radio-isotopes in agriculture are discussed.—M.P.

881† Drummond, J. C. and Wilbraham, Anne. **The Englishman's food. Five centuries of English diet.** Revised edn 1958, pp. 482, bibl. in text, 3 appendices, illus., 22 × 15 cm., London : Jonathan Cape, 36s.

One does not have to be a dietitian, or a gourmet, to appreciate this fascinating book, the second edition of which has been so long in appearing—presumably because of the tragic fate of Sir Jack Drummond. This second edition, revised by Miss D. Hollingsworth, who has also written a final chapter on the application of the newer knowledge of nutrition, is a worthy successor to the first. To agriculturists the main interest of this standard work lies in Chapters 9 and 16 on the rise of English agriculture and industry. The first of these chapters is an historical sketch of the fluctuating fortunes of British agriculture in the 18th century ; the agricultural revolution ; the Land Enclosure Acts and their tragic consequences ; the birth of experimental agriculture ; and the introduction of new crops and feeding stuffs. Chapter 16 is an historical account of the miserable state of agricultural and factory workers in the first half of the 19th century, the appalling growth of pauperism, the growing public concern about these conditions, the desperate food shortage following the outbreak of potato blight in conjunction with a poor grain harvest, the repeal of the Corn Laws, the subsequent amazing developments in industry, the drift from the country to town, and the beginning of the modern period of scientific agriculture. If anyone is inclined to decry our present scientific world and to long for the 'good old days', let him read this revealing book with its story of social change.

One of the fascinating features of this scholarly work is the large number of apt, and often humorous, quotations given as foot-notes. The documentation of the book is superb.—A. G. G. Hill.

NEWS ITEMS AND NOTES

Great Britain

882 MOBILE SEED-CLEANING PLANT. A complete mobile plant, with a capacity of 5 cwt./hr., has been designed for cleaning grass seed. Precleaned seed is fed to a hopper and subsequent processes extract material larger than grass seed and also small weed seeds. The plant can be adapted for the cleaning of grain for seed. *New Commonw.* 20 Jan., 1958.—M.H.

883 THESES FOR HIGHER DEGREES. A list is given of the titles and authors of theses accepted in 1954–5 for higher degrees in the Universities of Great Britain and Ireland. The following appear under the field-crops section : (1) Nicholson, G. E. Relationships and preliminary classification of Peruvian maize types ; (2) Barneveld, M. J. The effect of grazing and fertilizers on nutrient uptake, yield and straw characteristics in wheat. *Index to theses accepted for higher degrees in the Universities of Great Britain and Ireland. Vol. 5. 1954–55*, 1958, pp. 128–9, London: ASLIB.—C.L.S.

France

884† GROWING PLANTS IN ARID REGIONS. A device for growing plants in arid, sunny regions such as the Sahara, where saline water is available, has been developed at the Laboratoire de l'Énergie Solaire, Montlouis. Fresh water is obtained from saline water by solar evaporation and subsequent condensation. The plants are grown in partly enclosed spaces provided with light but in which evaporation is reduced. It is thought that forage crops, amongst others, could be grown by this method. *C.R. Acad. Agric. Fr.* No. 14, 1957.—E.B.O.

Netherlands

885 NETHERLANDS GRAIN CENTRE, WAGENINGEN. The first part of *International Contact*, an irregularly-published news-letter edited by S. Broekhuizen, appeared in July 1957. It contains an account of the organization of the Centre (see also *Fld Crop Abstr.* 10 : 1216), pp. 1–8 and 27–8 ; information on the ten-years' project on cereal research begun by the Centre in 1954 ; and an illustrated article on yellow-rust attack of wheat in Europe, pp. 13–26.—G.M.R.

Czechoslovakia

886 INDEX SEMINUM Institutorum Academiae Bohemoslovenicae Scientiarum Agriculturae pro anno 1958 et 1959. Seeds or tubers of many strains of field crops are offered by various research institutes.—M.H.

USSR

887 DETECTION OF INFECTED SEEDS. A rapid method for detecting the presence of certain harmful infections in crop seeds by the use of ultra-violet light has been reported by N. A. Naumova (*Biofizika*, Vol. 2, p. 376). While healthy seeds examined under ultra-violet light fluoresce brightly, infected seeds appear quite dull. The suggested reason for this difference is that fluorescence is stronger the drier the seeds, but that rust keeps infected seeds moist. The method can be used successfully with some other crops, such as certain peas and beans. However, with dark-coloured seeds, e.g. beetroot, there is no fluorescence even from healthy seeds. Nevertheless, although healthy seeds of round beet did not show any fluorescence, seeds infected with a fungus (*Phoma*), had fluorescent points on their surfaces, and these points were identified with the spore-carrying bodies of the fungus.—From *New Scient.* 31st October, 1957, p. 30.—M.H.

888 ZEMLEDELIE [*Agriculture*]. The December, 1957, issue of this journal contains popular articles which are classified as : (1) Measures for obviating the killing of winter cereals (The importance of clean fallow in the zone of moisture deficiency in Northern Caucasia, by N. N. Borodin ; Causes of winter-wheat failure in the Tambov Province, and remedial measures, by N. M. Šaminin ; Causes of cereal-crop failure in the Belgorod Province, by P. G. Tulupov and I. A. Obihvost) ; (2) Fodder production (The use of fodder lupin in field- and fodder-crop rotations in the Ukraine, by F. F. Jukimčuk) ; (3) Short communications (Sudan grass under irrigation, by L. N. Znamenskiĭ ; Grain sorghum—a valuable feed, by S. A. Mazurin ; Sorghum in Moldavia, by E. S. Vološin).

The January, 1958, issue contains the following sections : (a) Increasing soil fertility (The influence of annual plants on the accumulation of organic substances and structure of the soil, by T. K. Gaponenkov and others) ; (b) Development of new lands ; (c) Land utilization and planning ; (d) Short communications (The use of drained marshes in the Ukraine, by Ja. N. Lisovskiĭ).—M.H.

Canada

889† AERIAL PHOTOGRAPHY. The Division of Applied Physics of the National Research Council of Canada has developed a new photogrammetric method which permits the surveying of very long distances exclusively from the air. A complicated network of ground control points is not necessary. Simple and accurate bridging of distances up to 200 miles is now possible through the use of auxiliary data obtained by oblique photography and a radar altimeter. A new instrument has been devised which uses electronic computations rather than optical projections in plotting maps from aerial photographs. This indicates the eventual automation of mapping. These new techniques were described at the International Conference on Aerial Triangulation held in Ottawa, 28–31 August, 1957. *NRC Res. News* Sept., 1957.—D.B.

Australia

890 BULK TREATMENT OF RICE SEED. As the result of trials to control seed-borne diseases of rice, panogen was adopted for the treatment of bulk importations of rice. Panogen (2·1%) was mixed with 4 times its volume of water and applied to the seed, in a concrete-mixer, at the rate of 1·5 cc./kg. of seed, up to 24 hr. prior to sowing. The seed was then rebagged and stacked to permit maximum vapour action of the fungicide. Panogen was found not to affect germination, and to give good control of *Helminthosporium oryzae*. *Internat. Rice Comm. FAO* 1957.—M.P.

891† NEW TECHNIQUE TO SAVE WATER. In the Ouyen district of Victoria, the bottom and sides of a test dam have

been covered with a thin plastic film laid in wide strips and heat-sealed in an attempt to prevent water-loss by seepage. *Aust. agric. Newslett.* Jan., 1958.—M.P.

New Zealand

892 THE NEW ZEALAND INSTITUTE OF AGRICULTURAL SCIENCE (founded 1954). The 1956 Proceedings of this Institute include : Controlled climate, by K. J. Mitchell; and Isotopes in agriculture, by T. A. Rafter.—M.H.

China

893† AGRICULTURAL RESEARCH IN CHINA. A. Ciccarone, who took part in an Italian agro-biological mission to China in 1956, gives information on agricultural research in that country. There are 6 regional agricultural experiment stations under the Ministry of Agriculture, each dealing with a number of provinces. They are situated at : Kungchuling, north of Mukden ; Wukung, in the Shensi ; Peking ; Wuchang, in the Hupeh ; Nanking ; Canton (founded in April, 1956). It is intended to establish an agricultural station in each province under the supervision of the nearest regional station. The experimental stations are interested mainly in practical problems, such as the mechanization of rice-transplanting. In the Agricultural Departments of the Universities, which are under the Ministry of Education, laboratory investigations are carried out in addition to teaching. The Academia Sinica, Peking (directly under the Presidency of the Republic), is an institution for study and research which includes 50 institutes throughout the national territory; it co-ordinates the work of scientific societies and is also a consultant body. A National Institute for Agricultural Research (Academia Agriculturae) which is in process of being formed at Peking, will be under the Ministry of Agriculture. It will work in co-operation with, and, to a great extent, will replace, the Academia Sinica, in the co-ordination of agricultural investigations. *Genet. agr.* June, 1957.——E.B.O.

Review Articles

894 The following review articles appeared in *Field Crop Abstracts* Vol. 10, 1957:

DADD, C. V. Wild oats. 1957, **10**, No. 1, 1–10.

POHJAKALLIO, O. Light climate and crop growth in Finland. 1957, **10**, No. 2, 77–82.

DOGGETT, H. Bird-resistance in sorghum and the Quelea problem. 1957, **10**, No. 3, 153–6.

ORLOVSKIĬ, N.I. Monogerm sugar-beet. 1957, **10**, No. 4, 221–4. [Translation from Russian]

Enquiries received

895 Arising from enquiries received and answered by the Bureau from May, 1956, to February, 1958, bibliographies on the following were prepared and are available on request:

The control of aquatic weeds in reservoirs ; The number, size and distribution of the stomata of maize and sorghum ; Underground irrigation ; The cultivation, retting and scutching of flax ; Herbicides and defoliants for potatoes; Seed testing ; The comparative costs of growing crops under irrigation and natural rainfall.